California High-Speed Rail Authority

RFP No.: HSR 14-32

Request for Proposals for Design-Build Services for Construction Package 4

Book IV, Part C.4
Preliminary Ground Motions Guidelines

TABLE OF CONTENTS

[1]   Data points not plotted, see Attachments for data point files

CALIFORNIA
High-Speed Rail Authority

CONSTRUCTION PACKAGE 4
GROUND MOTION ZONE MAP

X MP S262.1
START OF CP 4

TULARE COUNTY

KERN COUNTY

Delano

Mcfarland

● POSO CREEK

MP S283.7
END OF CP 4

Shafter

The minimum CP 4 Special Site is: (1) Poso Creek. Ground motions based on the zoning designation (i.e. Zone 7) shall not be applied to the special site noted for final design. Site-response analysis is required to develop final time series at the special site using site-specific geotechnical data and using the response spectra and corresponding spectrally matched time series developed by the Authority for reference rock site conditions. Site-specific site-response analyses during final design for the special site noted shall be performed by the Contractor, based on the reference rock outcrop motions developed by the Authority and the Contractor's geotechnical explorations for final design post bid.
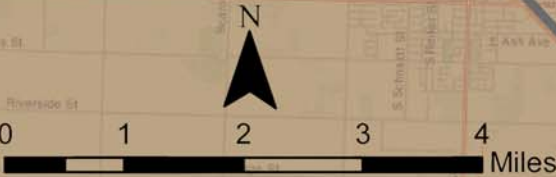
LEGEND
GM ZONE

——— 7

● Special Site

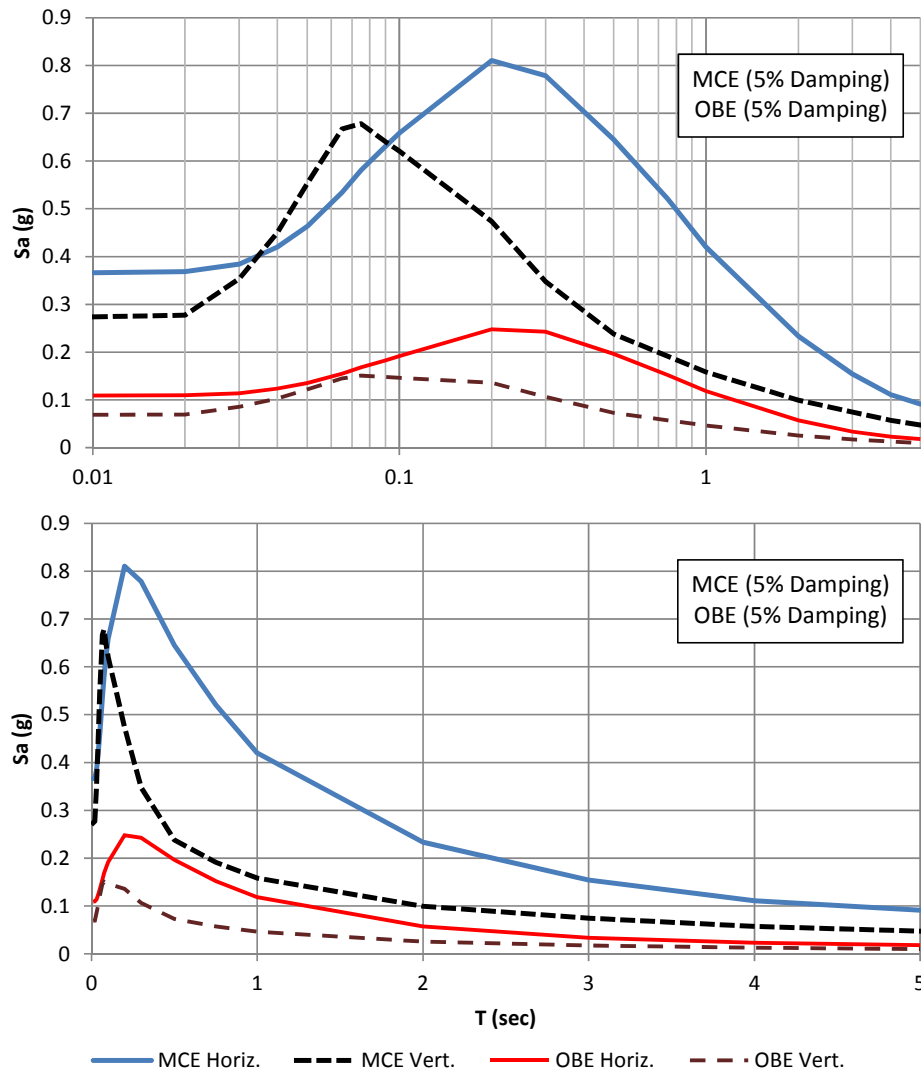| CP 4		
Start MP	End MP	Vs30 (m/s)
S262.1	S283.7	285

N

0 1 2 3 4 Miles

GROUND MOTIONS FOR DESIGN OF CONSTRUCTION PACKAGE 4 CALIFORNIA HIGH SPEED RAIL PROJECT

Ground motions are provided for Construction Package 4 alignment of the California High Speed Train Project. The Ground Motion Zone Map defines the limits of ground motion zones. This section includes digital formats of the ground motions, developed for design at Operating Basis Earthquake (OBE) and Maximum Considered Earthquake (MCE) seismic hazard levels, and the documented plots for these motions.

Included are the design spectra and seven digitally formatted files of developed ground motions for the OBE and MCE seismic design events, respectively. Each file includes seven sets of spectrally-matched motions (SMMs). Each SMM set, denoted by a Next Generation Attenuation (NGA) Models number (e.g., NGA_no_1094) leading the filename, includes three files representing for three components in Horizontal 1 (H1-), Horizontal 2 (H2-), and Vertical (V-) directions, respectively. Each of these three files includes the number of data points, time interval, two dummy numbers, and the digital formats for acceleration (denoted by accel in units of g), velocity (denoted by vel in units of cm/s), and displacement (denoted by displ in units of cm) history.

The PDF files for documented plots, ground motion metrics for selected seed motions and SMMs are first listed in a table. These metrics are earthquake name, year of the earthquake event, station name, moment magnitude (Mw), and distance (R) for each selected seed motion, and peak ground acceleration (PGA), peak ground velocity (PGV), peak ground displacement (PGD) in H1-, H2-, and V-directions, respectively, for each SMM. This is followed by 21 plates, each of which presents plots of time histories and SMM spectrum plotted against design spectrum for one component of the developed ground motions. The NGA number appeared in the filename of digital formats also services as a reference (appeared as NGA#) to the documented plots of the developed ground motions. In each plate, plots in the left show the time histories of acceleration (A), velocity (V), and displacement (D) of SMM. A signed peak value is shown at the right of each time history plot. Positive peak value for A, V, or D is located above the baseline of the time history, while negative peak value is shown below the baseline. In the right plot of each plate, the computed SMM spectrum is plotted against the target spectrum.

Fresno-Bakersfield Segment, Zone 7

MCE (5% Damping)
OBE (5% Damping)

MCE (5% Damping)
OBE (5% Damping)

MCE Horiz. ▬▬▬ MCE Vert. ▬ ▬ ▬ OBE Horiz. ▬▬▬ OBE Vert. ▬ ▬ ▬

Period, T (sec)	Spectral Acceleration, Sa (g)				Period, T (sec)	Spectral Acceleration, Sa (g)			
	MCE (5%, 950 Years)		OBE (5%, 50 Years)			MCE (5%, 950 Years)		OBE (5%, 50 Years)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.01	0.3662	0.2738	0.1094	0.0688	0.2	0.8105	0.4737	0.2478	0.1361
0.02	0.3685	0.2771	0.1097	0.0693	0.3	0.7786	0.3478	0.2426	0.1062
0.03	0.3840	0.3538	0.1141	0.0856	0.5	0.6451	0.2382	0.1967	0.0727
0.04	0.4201	0.4500	0.1238	0.1029	0.75	0.5202	0.1914	0.1519	0.0572
0.05	0.4633	0.5530	0.1355	0.1218	1	0.4198	0.1582	0.1184	0.0461
0.065	0.5341	0.6673	0.1549	0.1454	2	0.2334	0.0994	0.0571	0.0256
0.075	0.5810	0.6779	0.1681	0.1511	3	0.1543	0.0748	0.0338	0.0173
0.09	0.6304	0.6403	0.1826	0.1478	4	0.1110	0.0572	0.0233	0.0127
0.1	0.6586	0.6207	0.1916	0.1464	5	0.0912	0.0477	0.0182	0.0100

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	M. Tabatabaie
DATE:	02/27/2012

PLATE C-7. ZONE 7 DESIGN SPECTRA: OBE AND MCE

CALIFORNIA HIGH SPEED TRAIN PROJECT
MERCED TO BAKERSFILED, CALIFORNIA

Fresno-Bakersfield Segment, Zone 7

MCE (5% Damping)
OBE (5% Damping)

MCE (5% Damping)
OBE (5% Damping)

T (sec)

—— MCE Horiz. – – – MCE Vert. —— OBE Horiz. – – · OBE Vert.
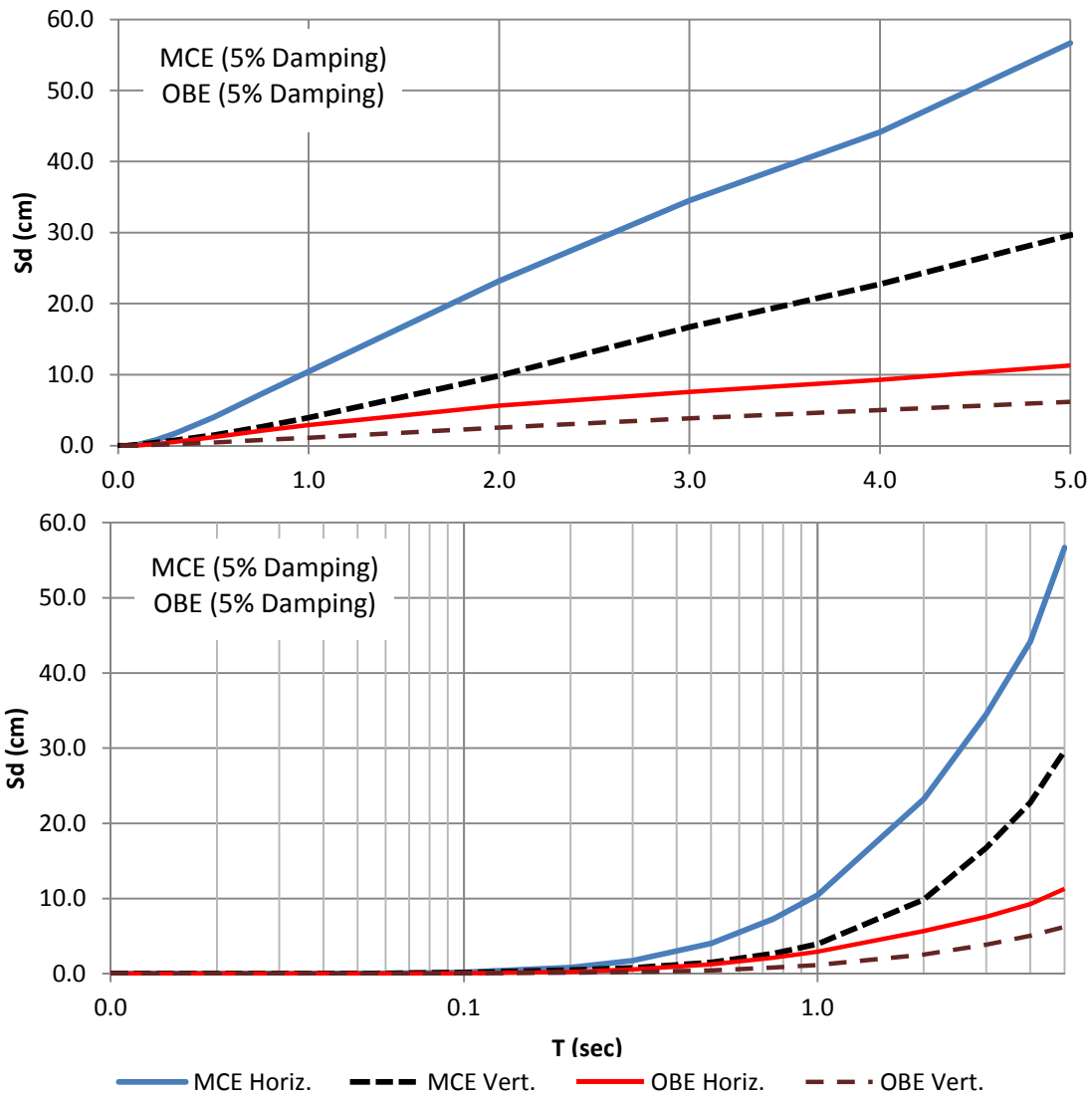
Period, T (sec)	Displacement Spectra, Sd (cm)				Period, T (sec)	Displacement Spectra, Sd (cm)			
	MCE (5% Damping)		OBE (5% Damping)			MCE (5% Damping)		OBE (5% Damping)	
	Horizontal	Vertical	Horizontal	Vertical		Horizontal	Vertical	Horizontal	Vertical
0.010	0.0009	0.0007	0.0003	0.0002	0.200	0.8056	0.4708	0.2463	0.1353
0.020	0.0037	0.0028	0.0011	0.0007	0.300	1.7413	0.7778	0.5426	0.2375
0.030	0.0086	0.0079	0.0026	0.0019	0.500	4.0075	1.4798	1.2220	0.4516
0.040	0.0167	0.0179	0.0049	0.0041	0.750	7.2711	2.6753	2.1232	0.7995
0.050	0.0288	0.0344	0.0084	0.0076	1.000	10.4316	3.9311	2.9421	1.1455
0.065	0.0561	0.0701	0.0163	0.0153	2.000	23.1990	9.8800	5.6755	2.5445
0.075	0.0812	0.0948	0.0235	0.0211	3.000	34.5078	16.7284	7.5591	3.8690
0.090	0.1269	0.1289	0.0368	0.0297	4.000	44.1319	22.7418	9.2637	5.0493
0.100	0.1637	0.1542	0.0476	0.0364	5.000	56.6558	29.6325	11.3063	6.2123

PROJ. NO:	**PLATE D-1. ZONE 7 DISPLACEMENT SPECTRA: OBE AND MCE**
BY: J. Zhong	
QC CHECK: F. Waggoner	
QA CHECK: V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT
DATE: 04/22/2015	MERCED TO BAKERSFILED, CALIFORNIA

Table A.1: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 7**

| Set | NGA # | Selected Seed Motions | | | | | Spectrally-Matched Motions | | | | | | | | |
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	882	Landers	1992	North Palm Springs	7.28	26.84	0.354	30.782	16.948	0.342	34.901	19.742	0.258	16.210	9.338
2	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.4	0.363	37.735	26.725	0.357	41.501	24.058	0.265	15.937	10.929
3	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.9	104.94	0.345	43.628	24.595	0.347	35.867	31.230	0.252	21.143	21.032
4	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.361	35.953	12.358	0.350	36.575	14.794	0.275	14.644	10.347
5	169	Imperial Valley-06	1979	Delta	6.53	22.03	0.356	31.136	20.328	0.360	32.386	18.177	0.265	15.569	10.691
6	1208	Chi-Chi, Taiwan	1999	CHY046	7.62	24.11	0.339	40.482	26.206	0.349	37.091	26.145	0.249	23.194	18.883
7	1164	Kocaeli, Turkey	1999	Istanbul	7.51	51.95	0.378	54.498	83.179	0.352	64.483	48.875	0.264	32.725	45.421

SC SOLUTIONS

PROJ. NO:		SELECTED SEED AND SPECTRALLY-MATCHED MOTIONS MCE – ZONE 7	PLATE
BY:	J. Zhong		
QC CHECK:	M. Perez		**A7-0**
QA CHECK:	V. Jacob		
DATE:	09/07/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A(g)   -0.35

V (cm/s)   30.78

D (cm)   16.94

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

Spectrally-Matched Motion
Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015
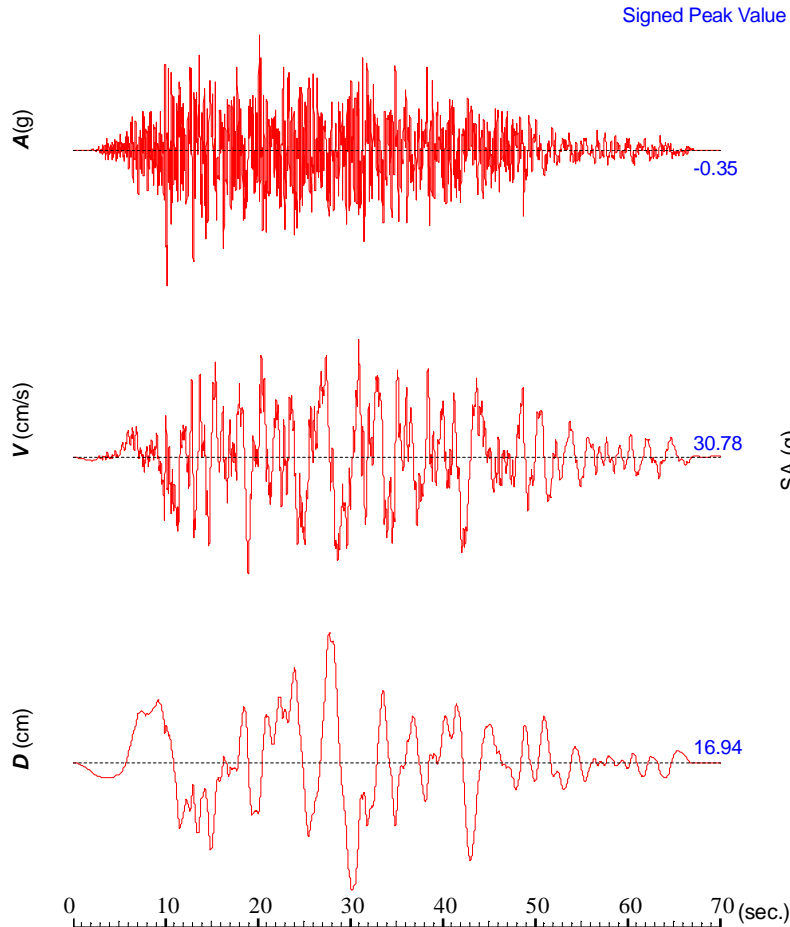
SC SOLUTIONS

PROJ. NO:
BY: J. Zhong
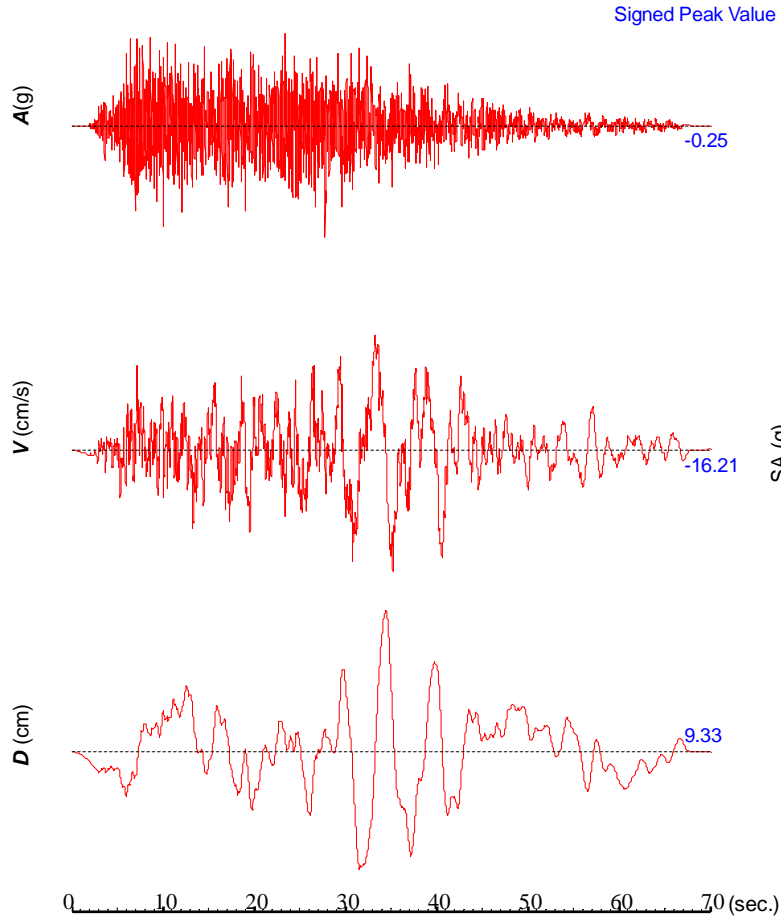QC CHECK: M. Perez
QA CHECK: V. Jacob
DATE: 09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 1 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA
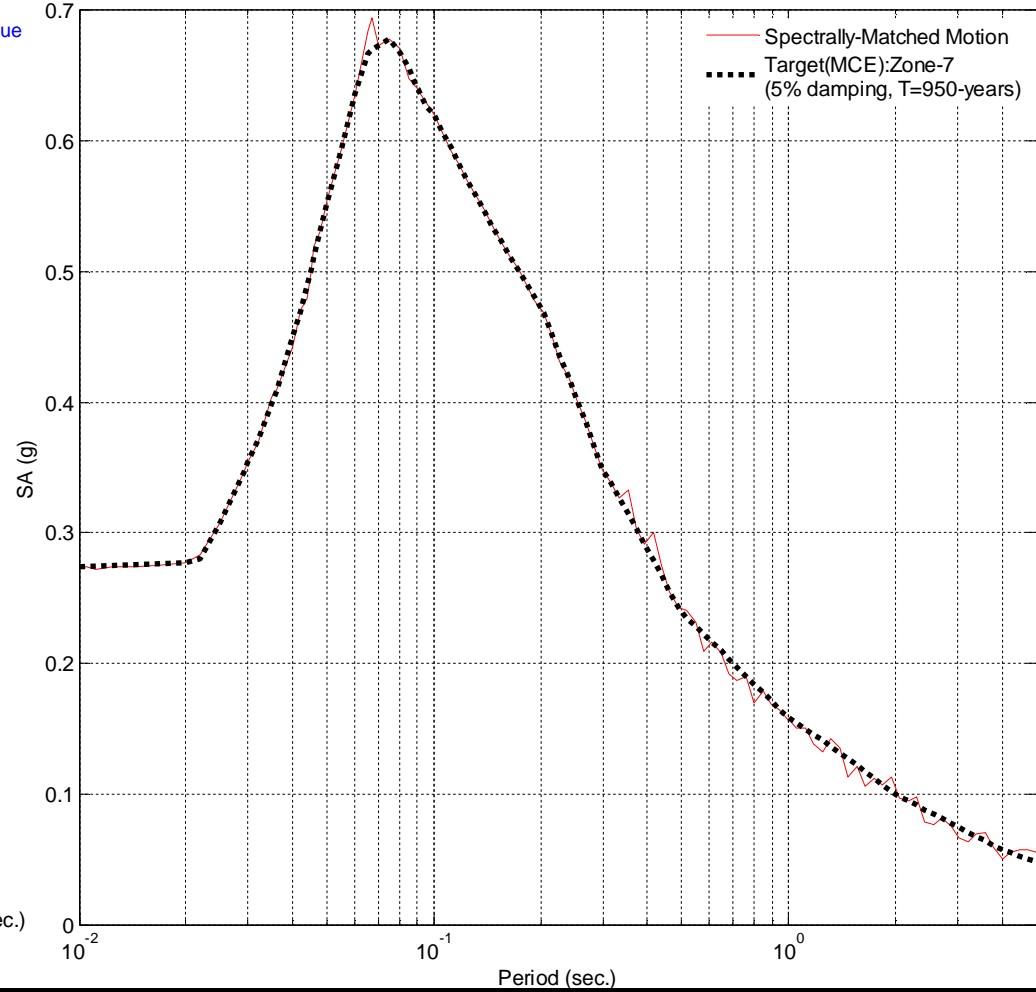
PLATE

A7-1

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A (g)   -0.34

V (cm/s)   34.9

D (cm)   19.74

0   10   20   30   40   50   60   70 (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 1 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**A7-2**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	09/07/2012		

Time Histories for Spectrally-Matched Motion
(V-Component)

Signed Peak Value

A(g)

-0.25

V (cm/s)

-16.21

D (cm)

9.33

0   10   20   30   40   50   60   70 (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE
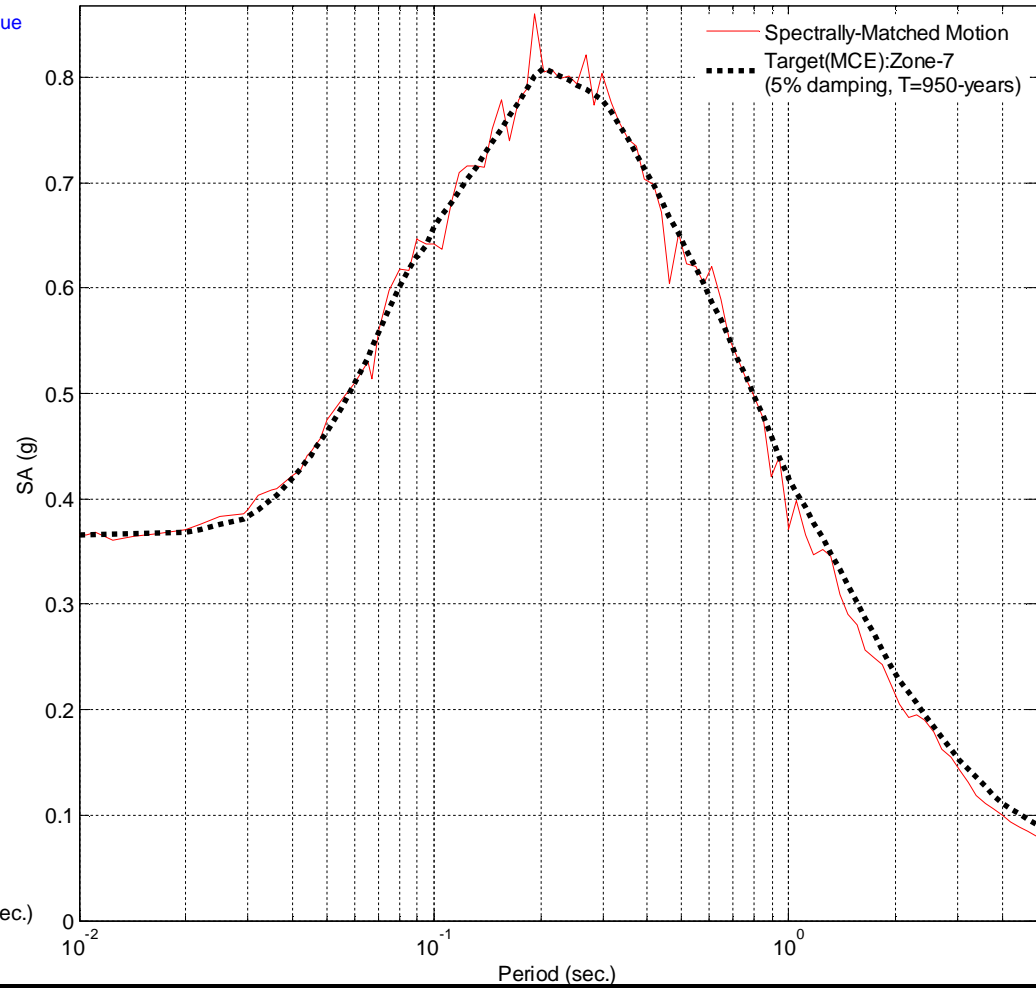
A7-3

Time Histories for Spectrally-Matched Motion
(H1-Component)
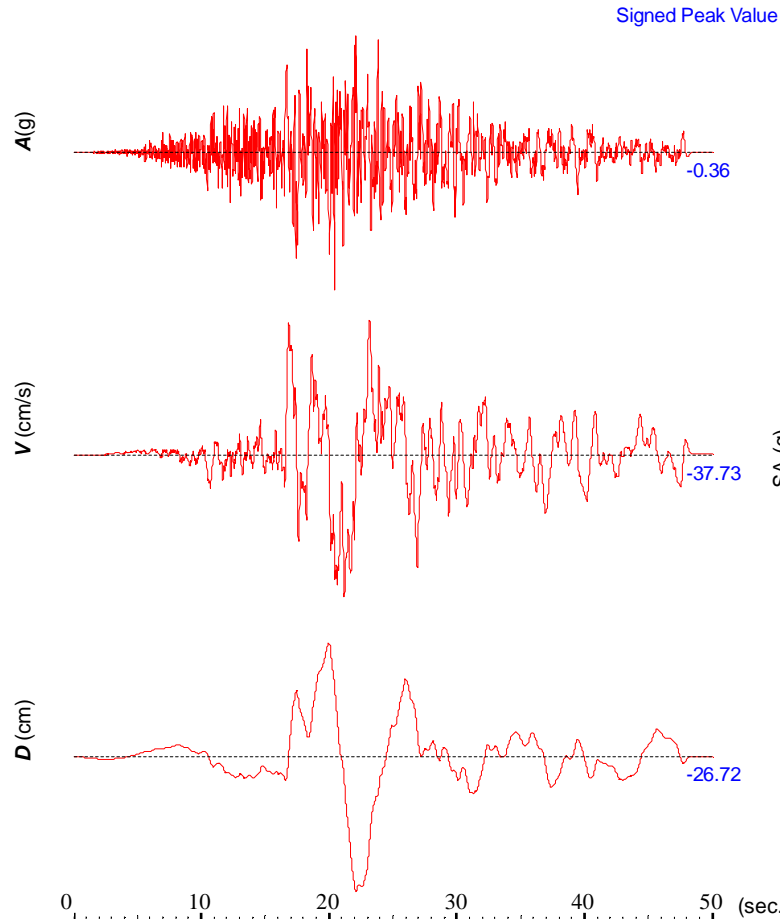
Signed Peak Value

A(g)

-0.36

V (cm/s)

-37.73

D (cm)

-26.72

0   10   20   30   40   50 (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1776):Hector Mine(1999), Station Name:Desert Hot Springs]

—— Spectrally-Matched Motion
••••• Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

0.8

0.7

0.6

0.5

0.4

0.3

0.2

0.1

10^{-2} 10^{-1} 10^{0}

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 2 – HORIZONTAL 1

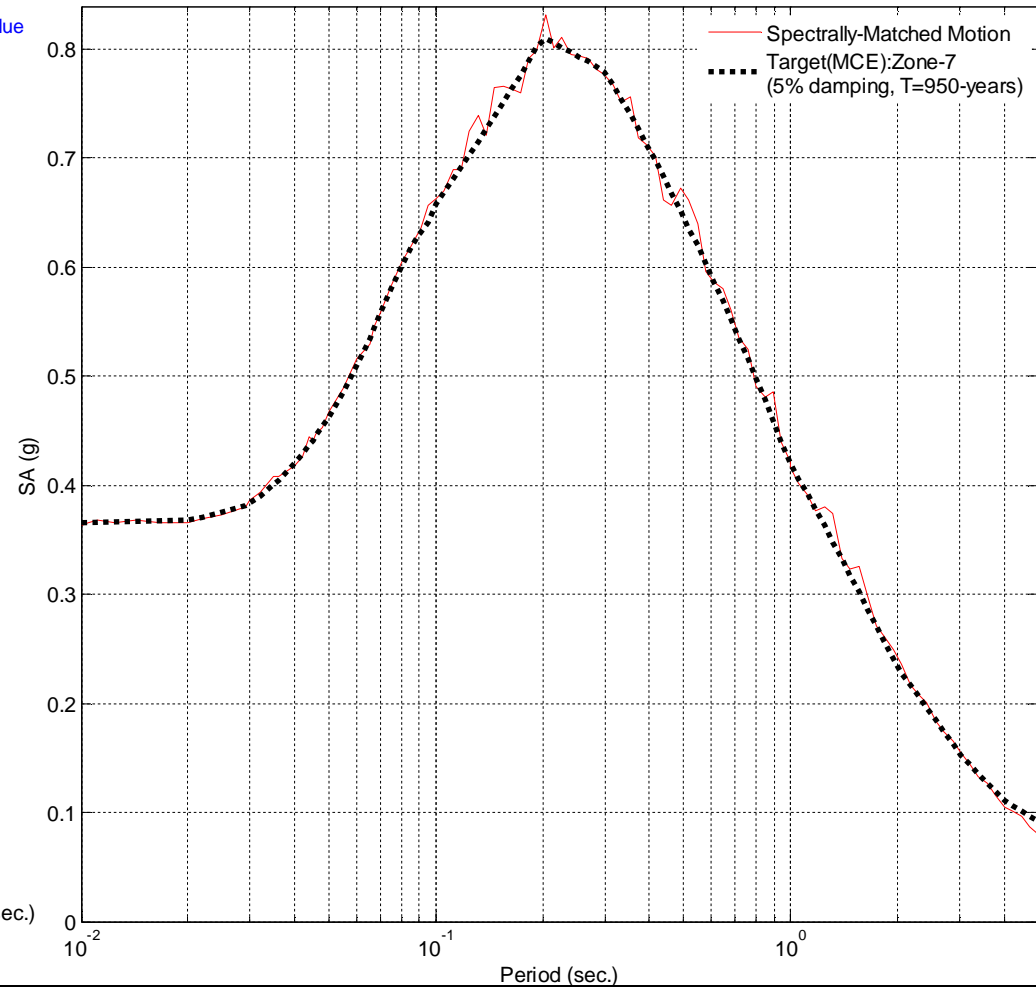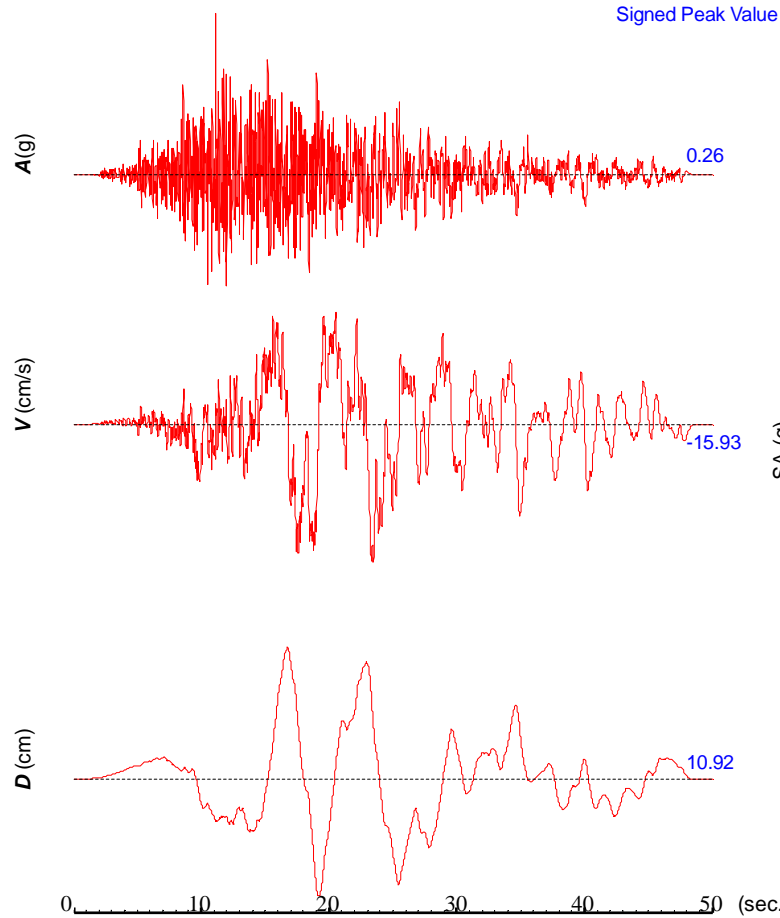CALIFORNIA HIGH SPEED TRAIN PROJECT
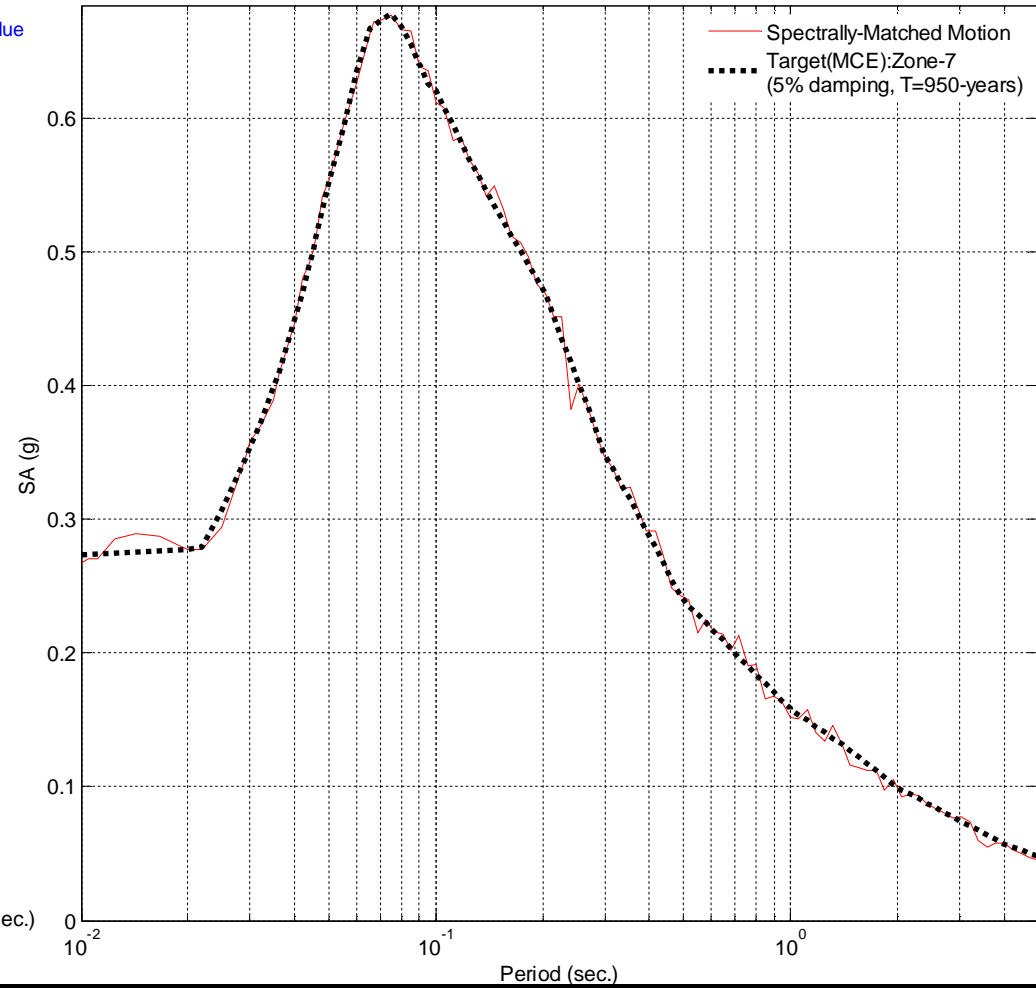FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-4

Time Histories for Spectrally-Matched Motion (H2-Component)
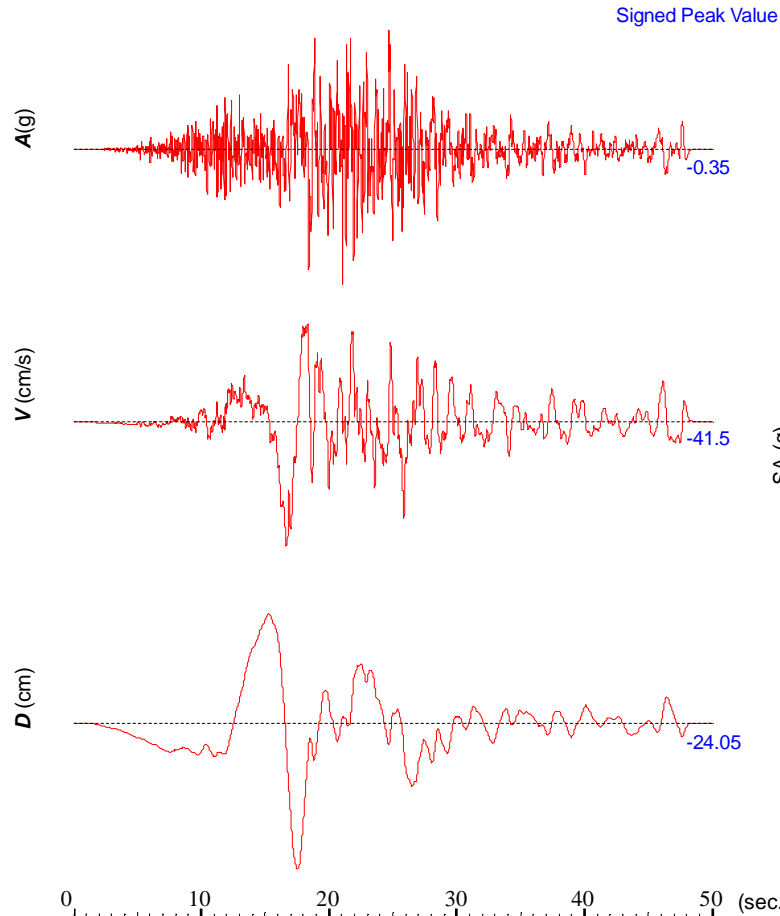
Signed Peak Value

A (g)

-0.35

V (cm/s)

-41.5

D (cm)

-24.05

0   10   20   30   40   50   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1776):Hector Mine(1999), Station Name:Desert Hot Springs]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
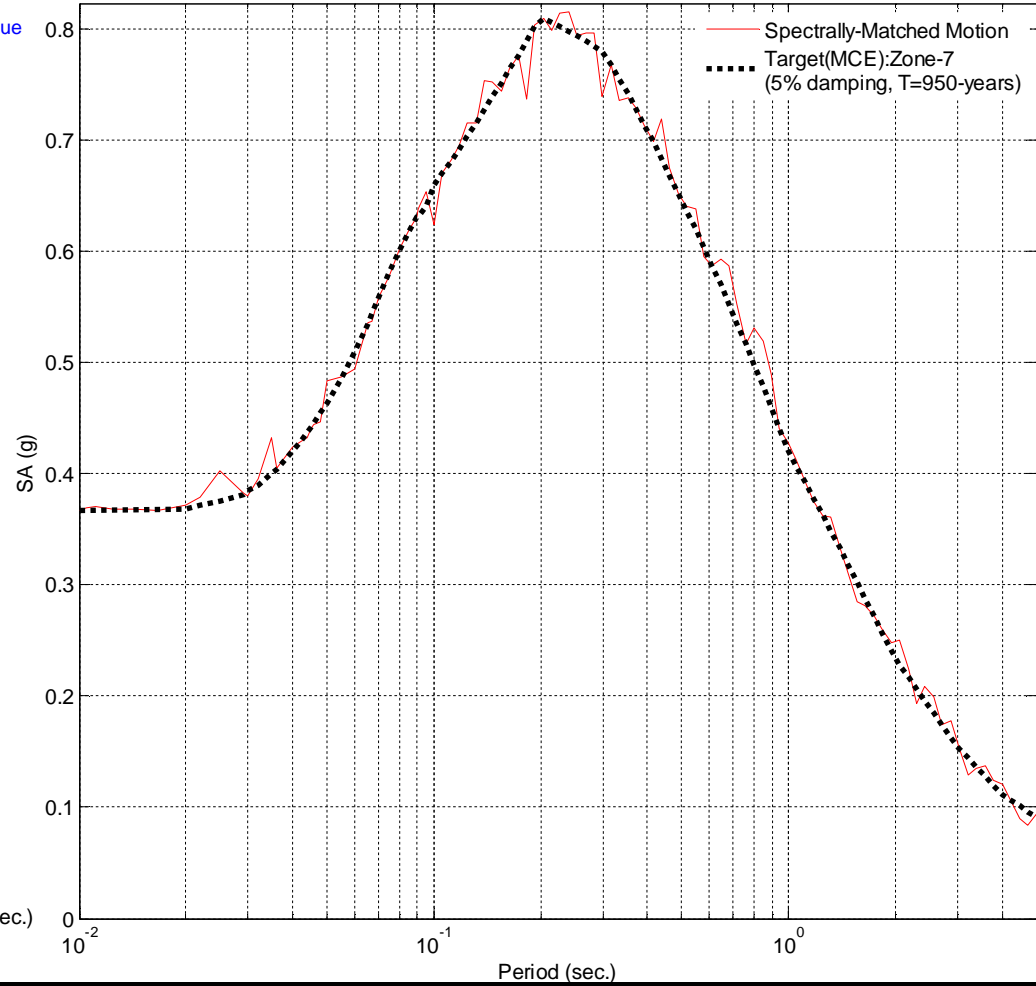MOTIONS – MCE
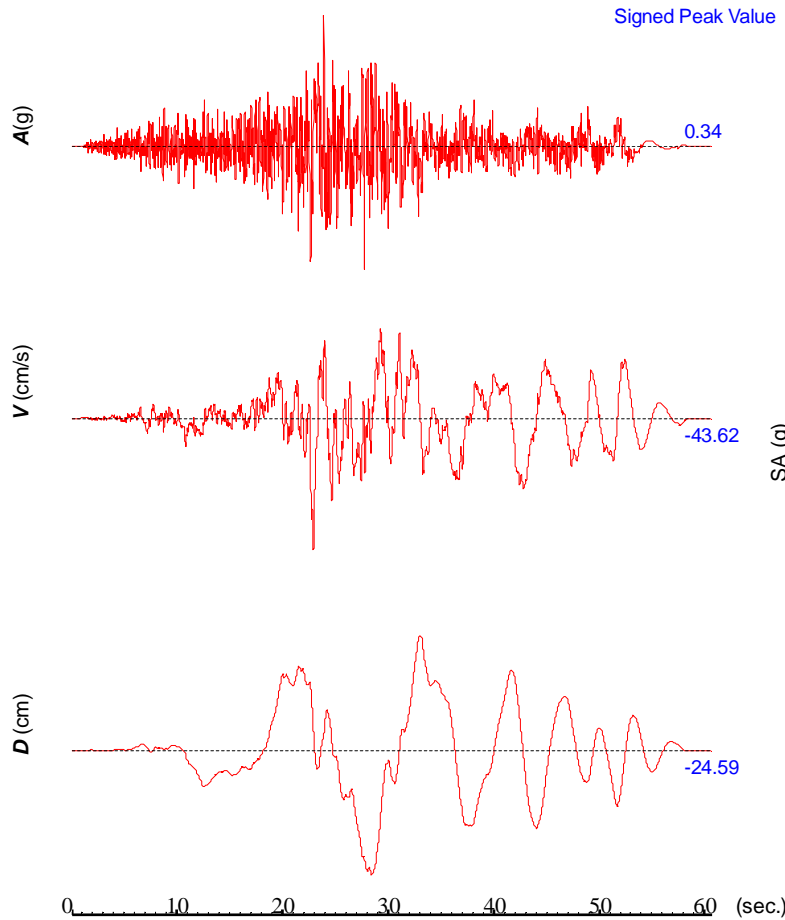ZONE 7 – SET NO. 2 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-5

Time Histories for Spectrally-Matched Motion (V-Component)

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1776):Hector Mine(1999), Station Name:Desert Hot Springs]

Signed Peak Value

A(g)   0.26

V (cm/s)   -15.93

D (cm)   10.92

0   10   20   30   40   50   (sec.)

Spectrally-Matched Motion
Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

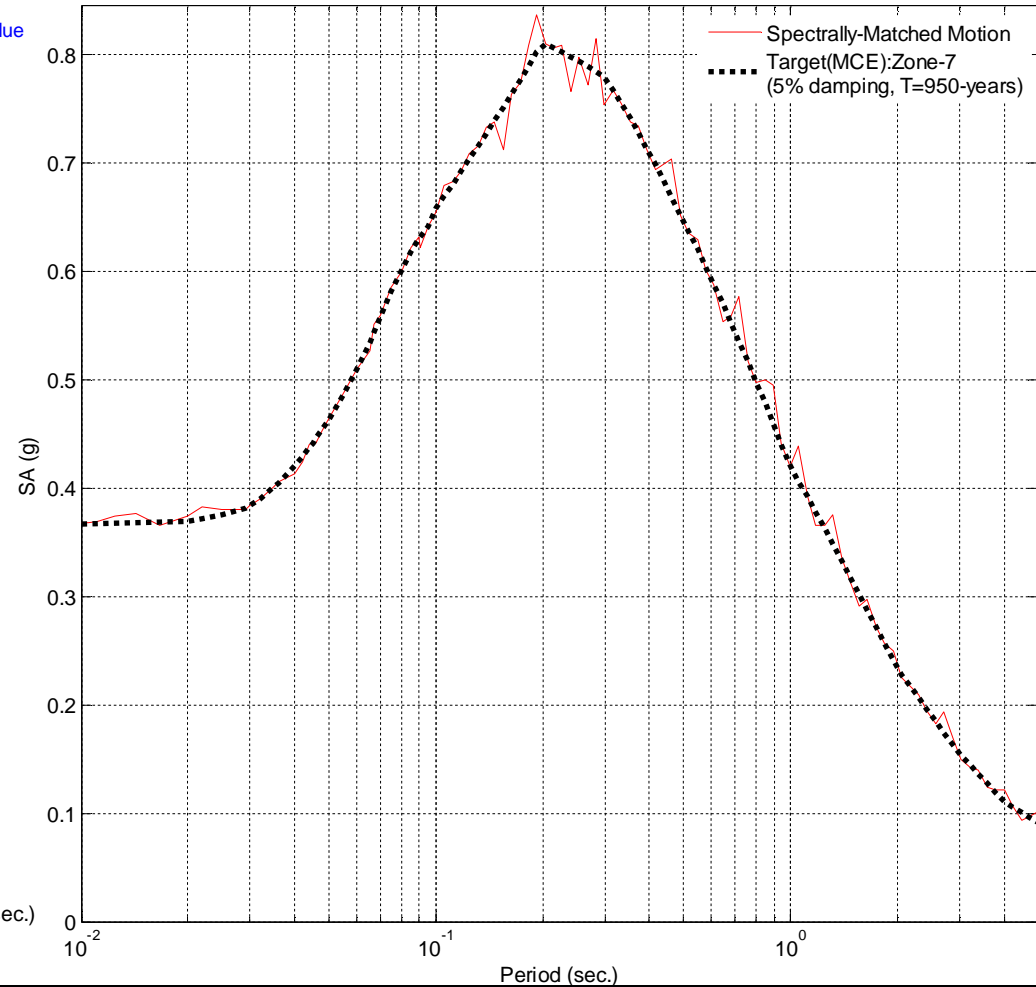SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 2 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-6

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A(g)   0.34

V (cm/s)   -43.62

D (cm)   -24.59

0   10   20   30   40   50   60   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

—— Spectrally-Matched Motion
••••• Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

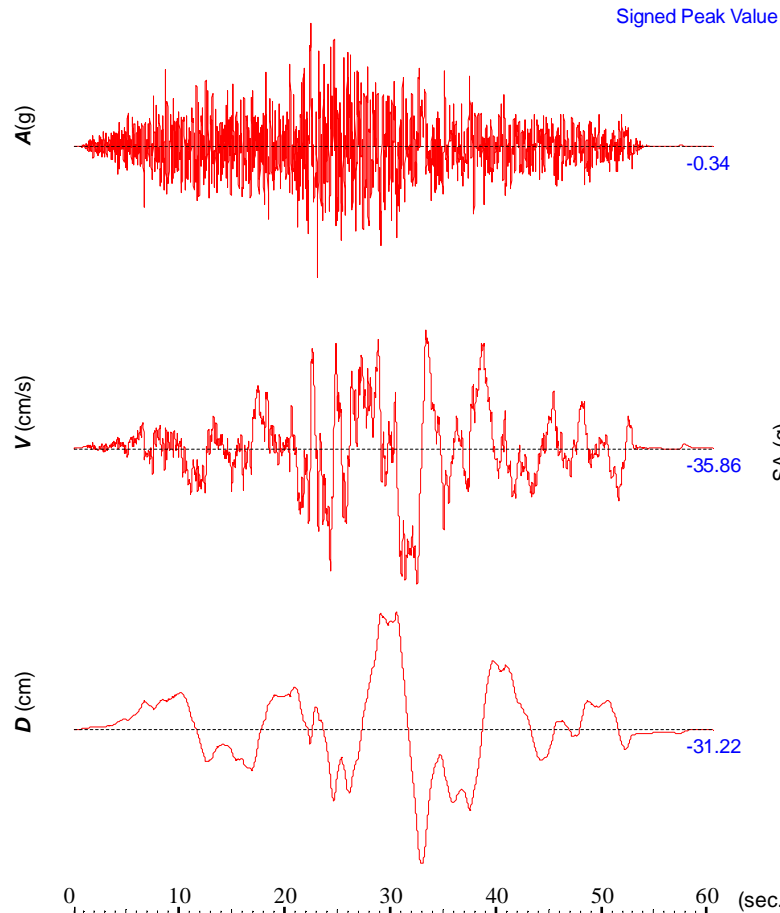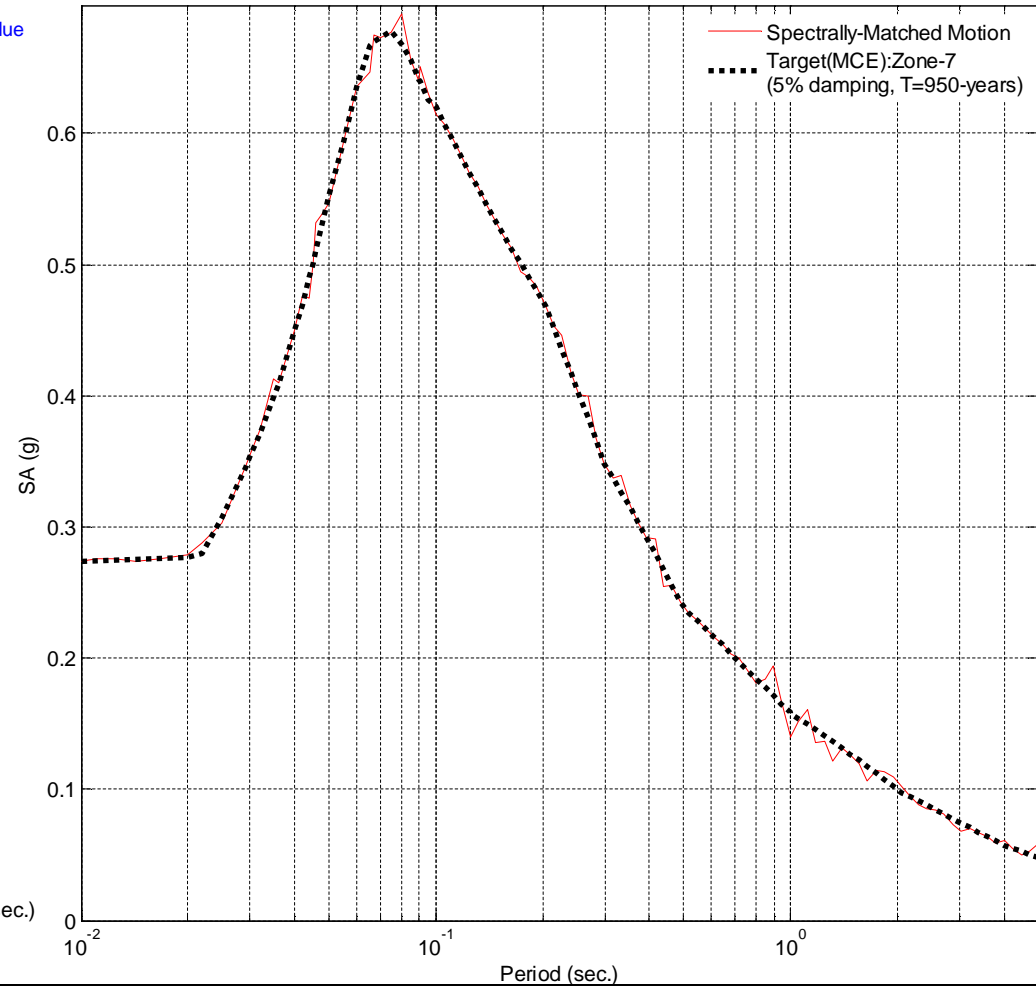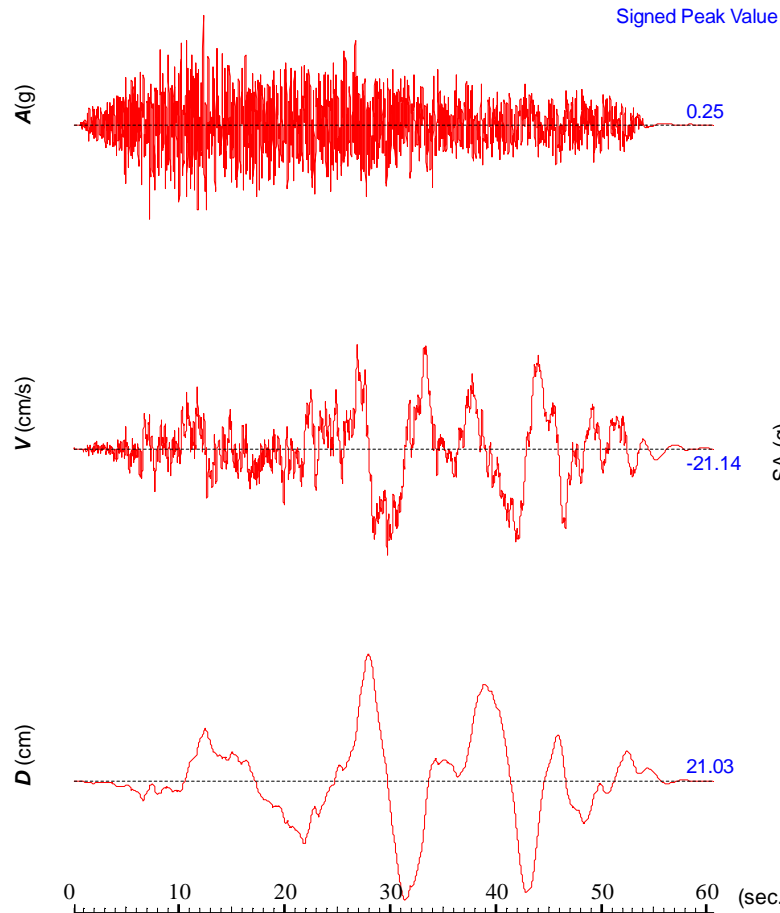| PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 3 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-7

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A(g)

-0.34

V (cm/s)

-35.86

D (cm)

-31.22

0   10   20   30   40   50   60   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
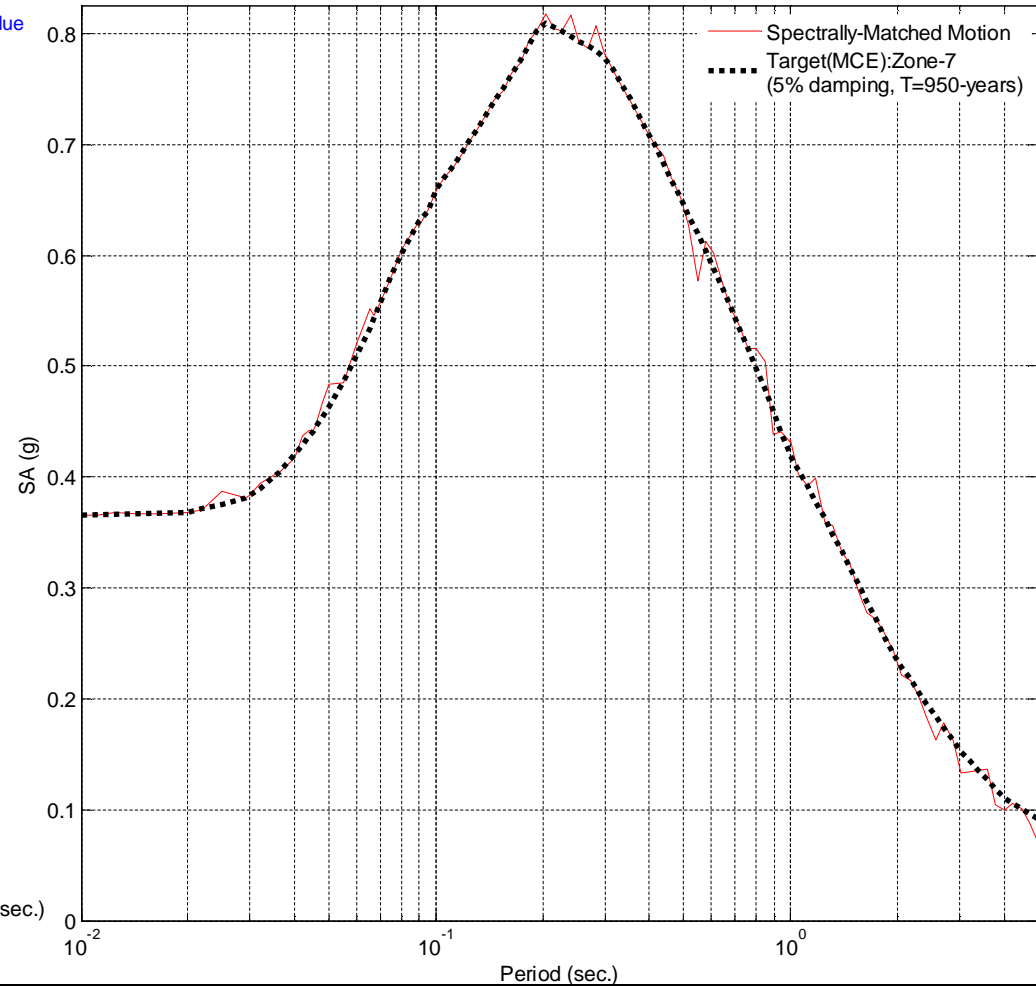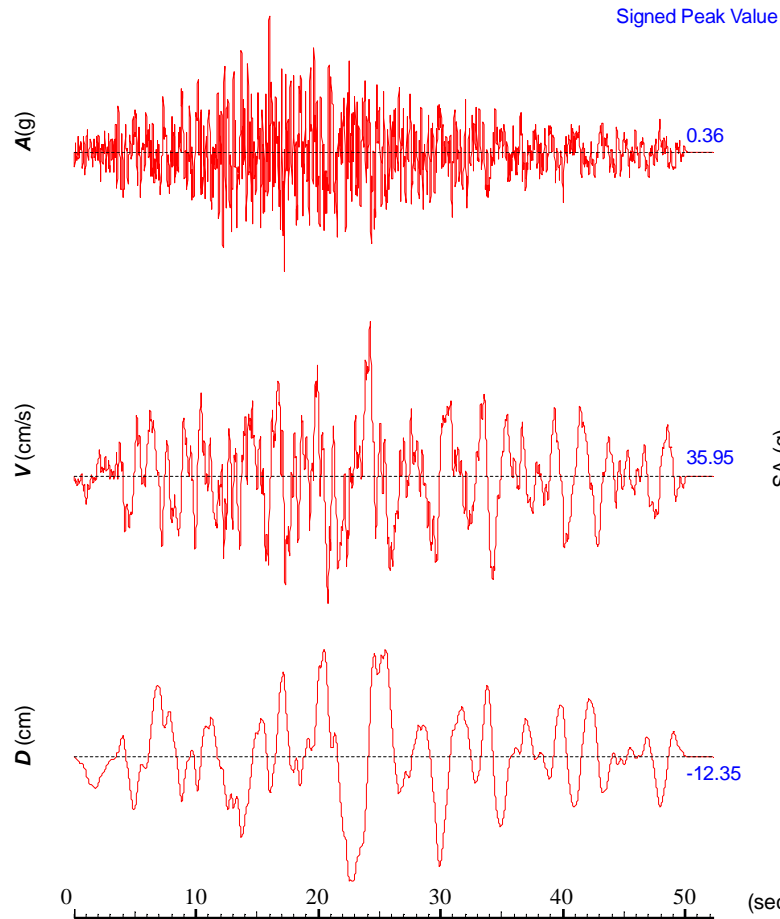MOTIONS – MCE
ZONE 7 – SET NO. 3 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-8

Time Histories for Spectrally-Matched Motion
(V-Component)

Signed Peak Value

A(g)

0.25

V (cm/s)

-21.14

D (cm)

21.03

0   10   20   30   40   50   60   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

—— Spectrally-Matched Motion
••••• Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

0.6

0.5

0.4

0.3

0.2

0.1

0

10⁻²   10⁻¹   10⁰

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 3 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-9

**Time Histories for Spectrally-Matched Motion
(H1-Component)**

Signed Peak Value

A(g)

0.36

V(cm/s)

35.95

D(cm)

-12.35

0   10   20   30   40   50   (sec.)

**Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]**

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 4 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
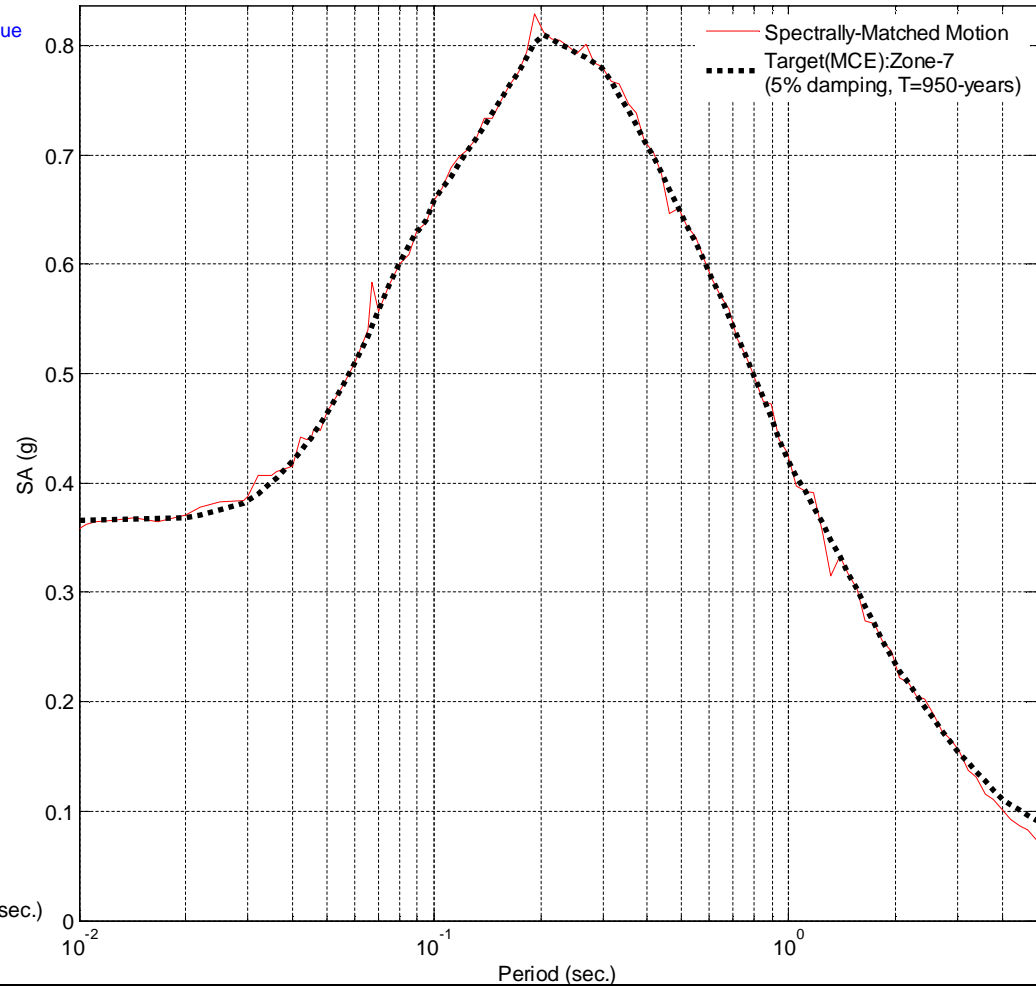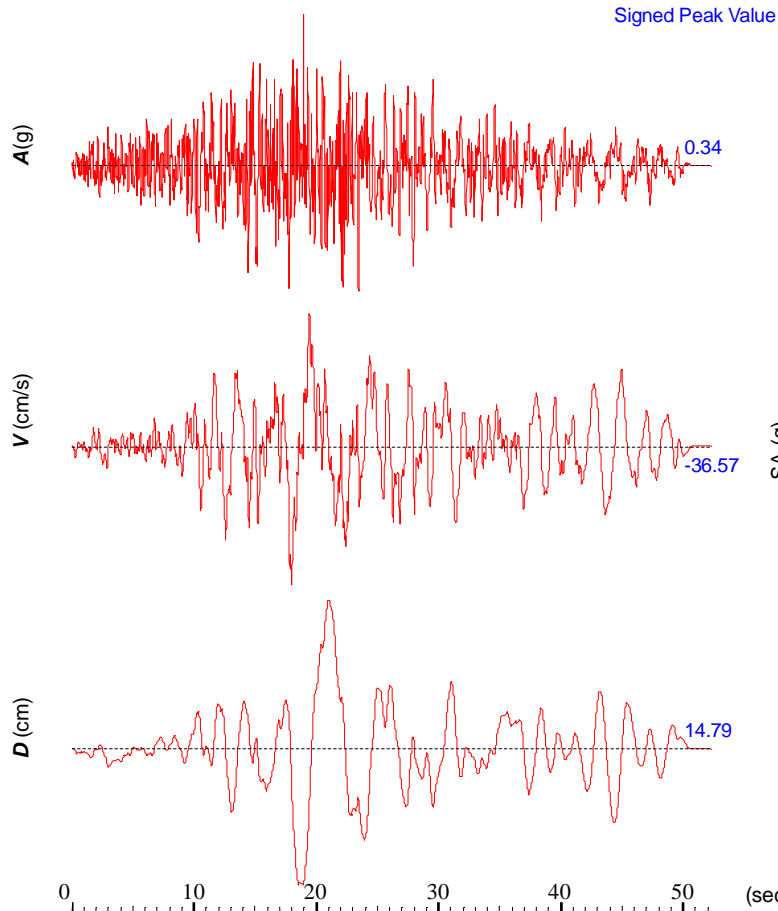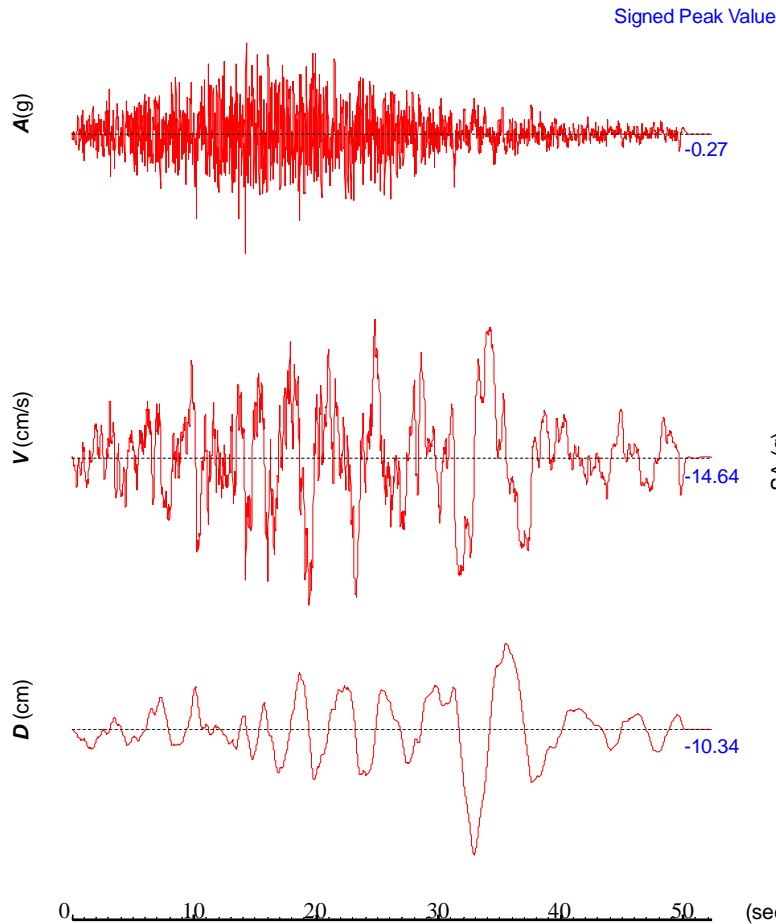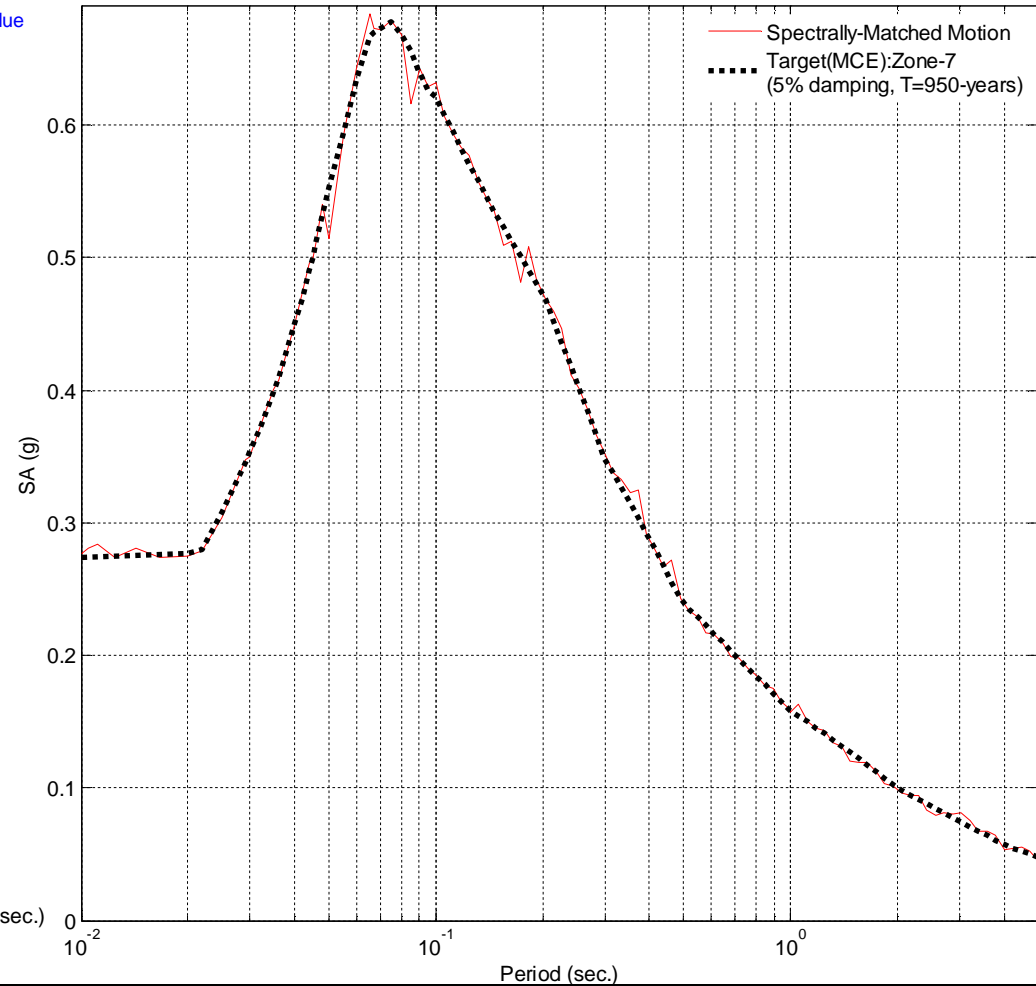FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-10

Time Histories for Spectrally-Matched Motion
(H2-Component)

Signed Peak Value

A(g)   0.34

V (cm/s)   -36.57

D (cm)   14.79

0   10   20   30   40   50   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]

—— Spectrally-Matched Motion
····· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

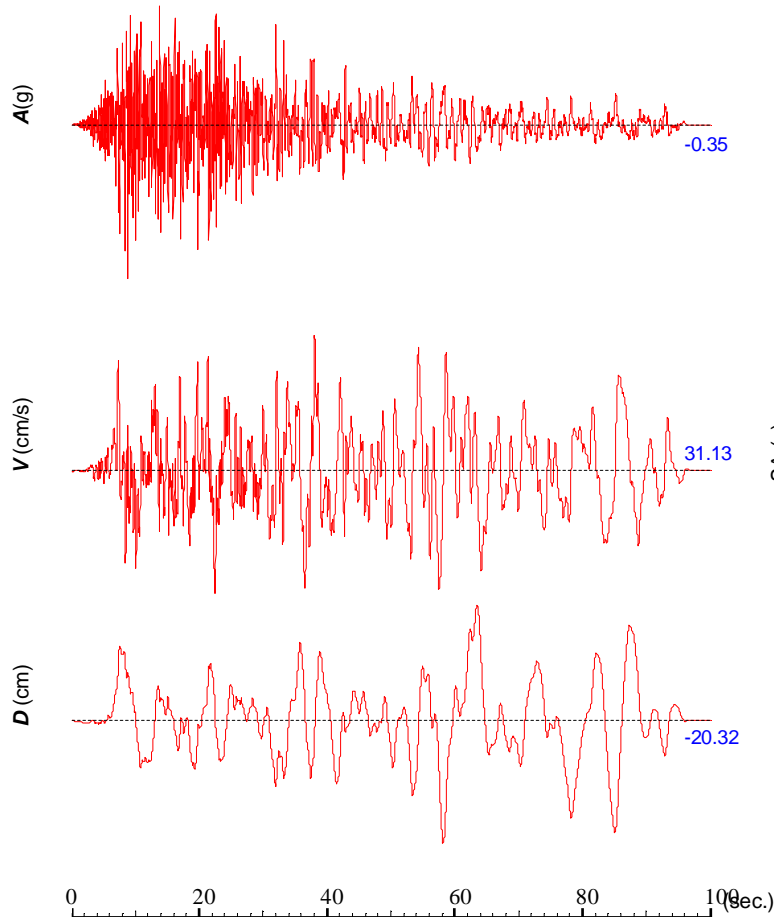| PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 4 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**A7-11**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/07/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A (g)

-0.27

V (cm/s)

-14.64

D (cm)

-10.34

0   10   20   30   40   50   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

0.6
0.5
0.4
0.3
0.2
0.1
0

10⁻²   10⁻¹   10⁰

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 4 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
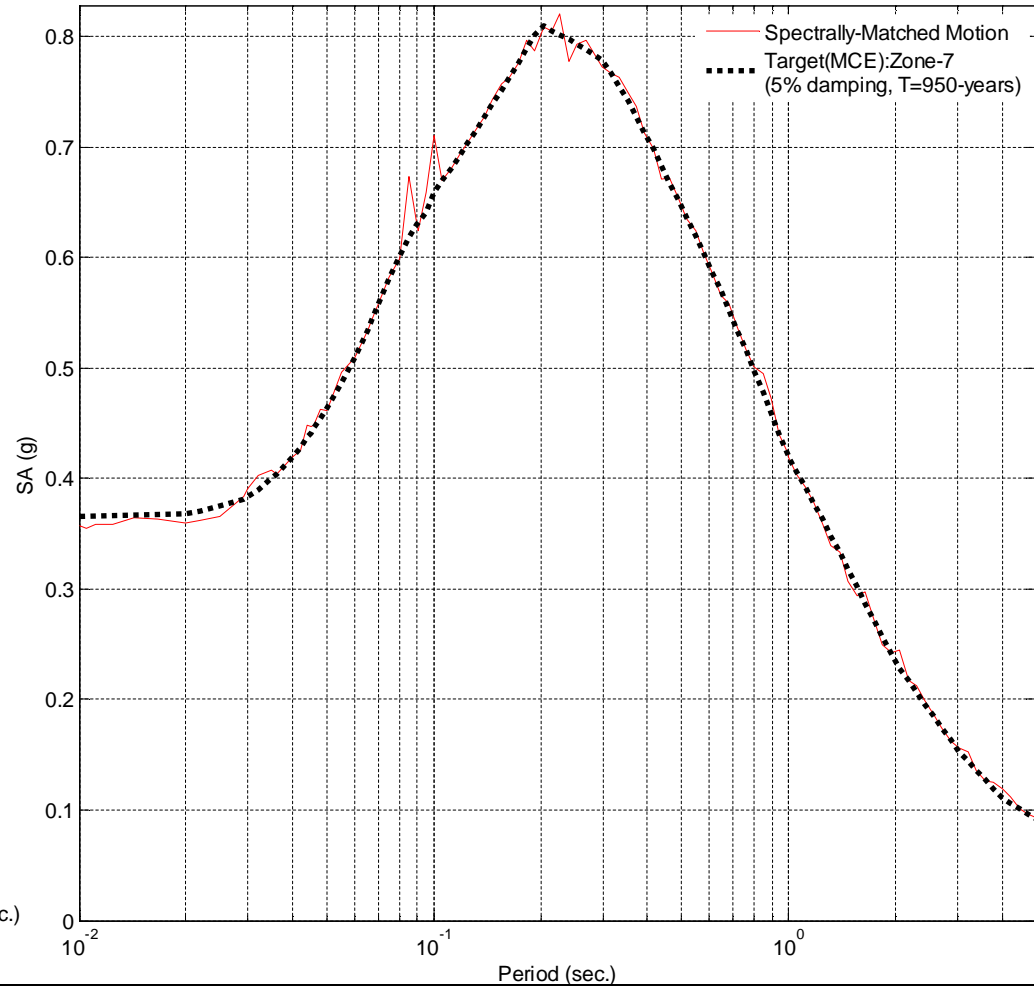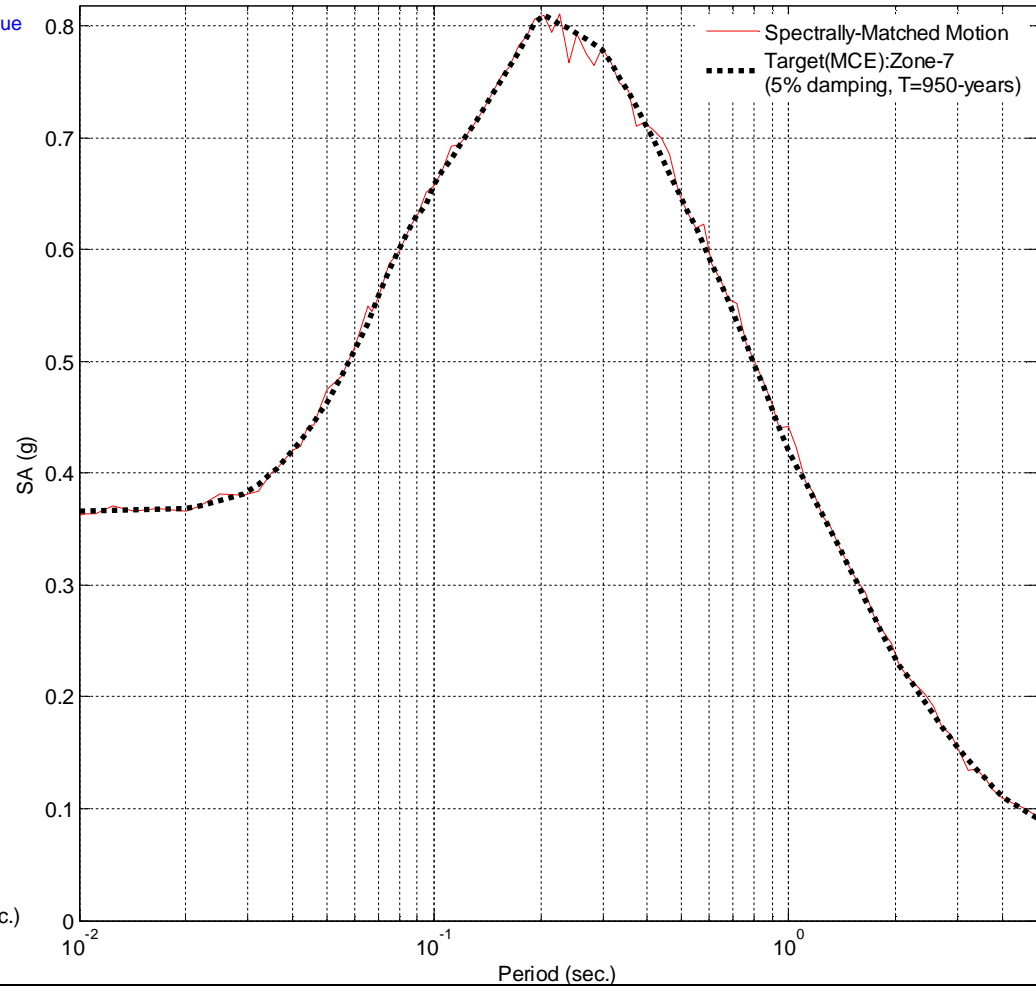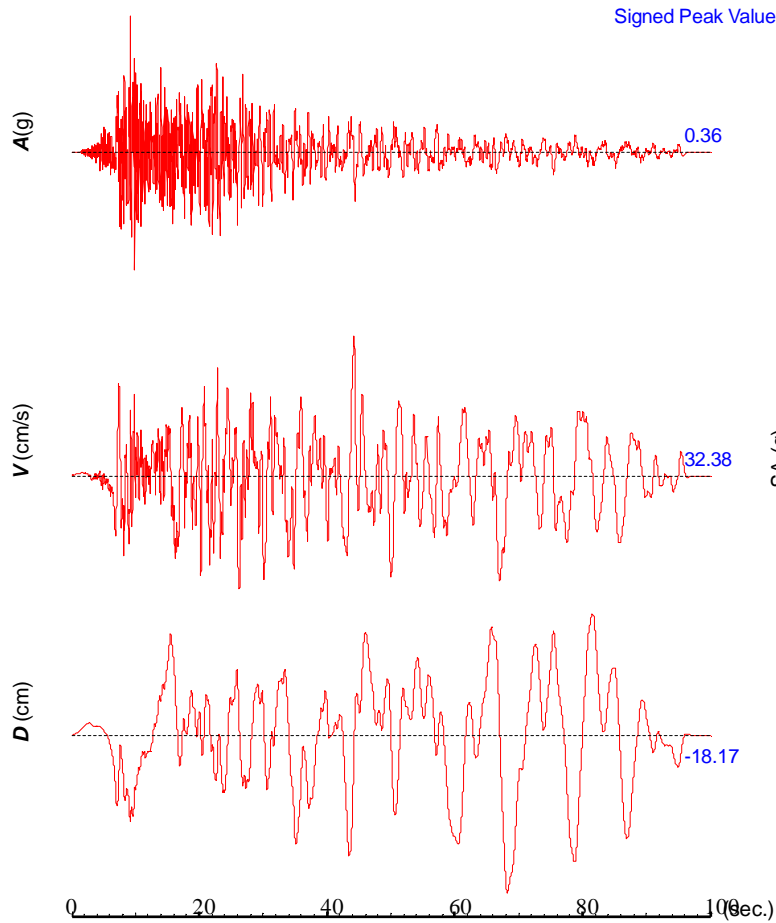FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-12

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A (g)   -0.35

V (cm/s)   31.13

D (cm)   -20.32

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#169):Imperial Valley-06(1979), Station Name:Delta]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7 (5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

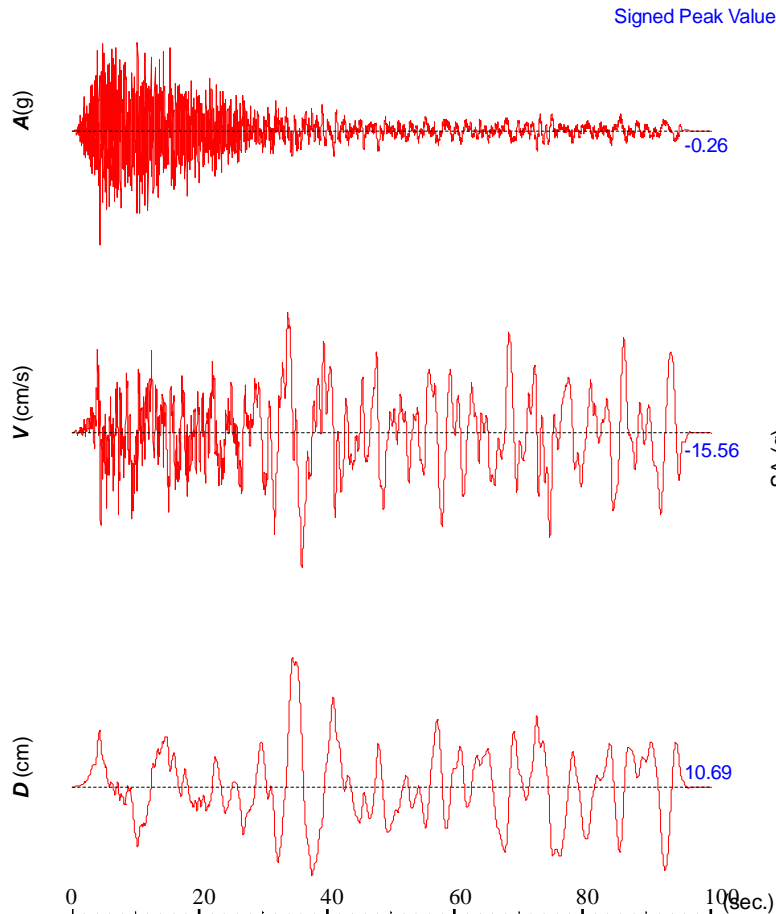| PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 5 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-13

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A (g)   0.36

V (cm/s)   32.38

D (cm)   -18.17

0   20   40   60   80   100 (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#169):Imperial Valley-06(1979), Station Name:Delta]

—— Spectrally-Matched Motion
▪▪▪▪ Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 5 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
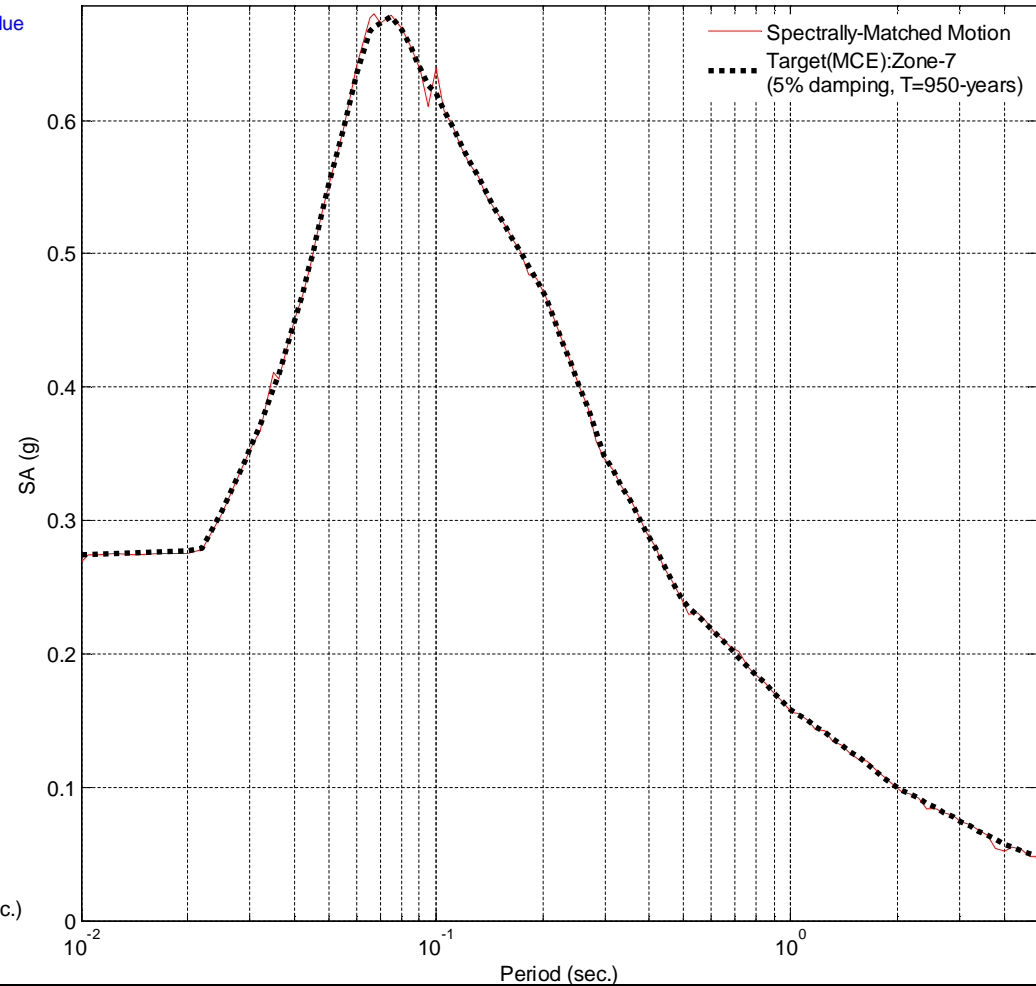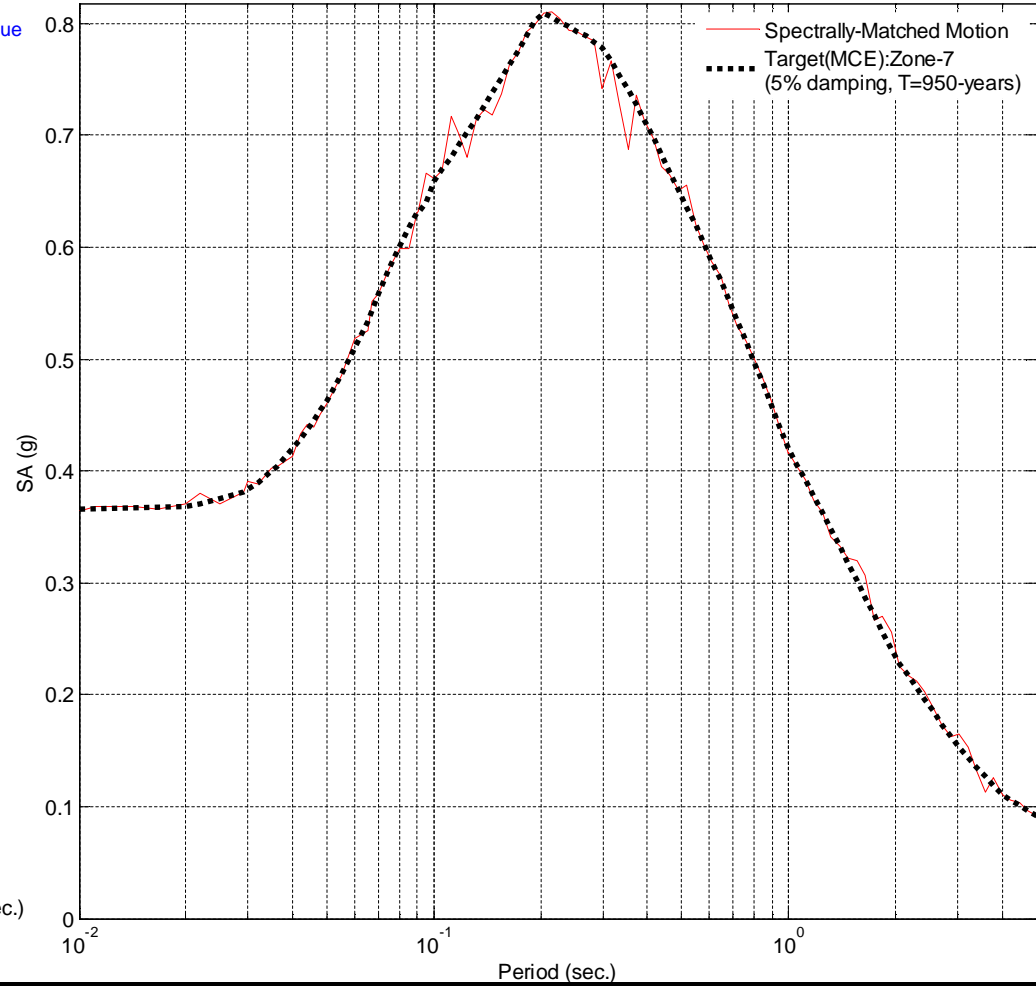FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-14

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A (g)   -0.26

V (cm/s)   -15.56

D (cm)   10.69

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#169):Imperial Valley-06(1979), Station Name:Delta]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
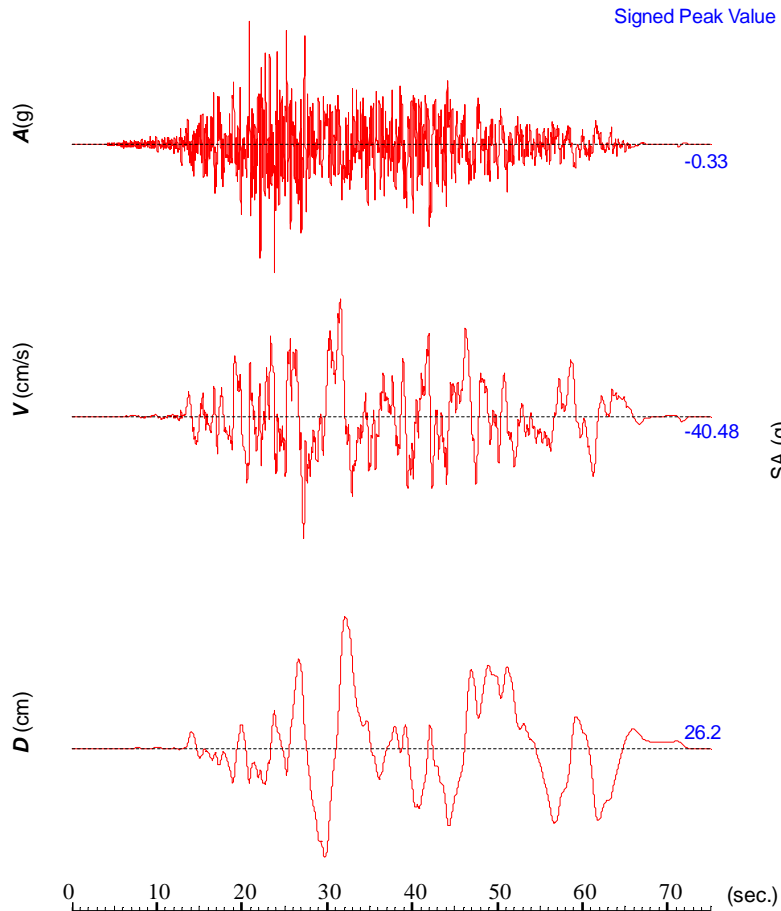ZONE 7 – SET NO. 5 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-15

Time Histories for Spectrally-Matched Motion
(H1-Component)

Signed Peak Value

A (g)

-0.33

V (cm/s)

-40.48

D (cm)

26.2

0   10   20   30   40   50   60   70   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1208):Chi-Chi, Taiwan(1999), Station Name:CHY046]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

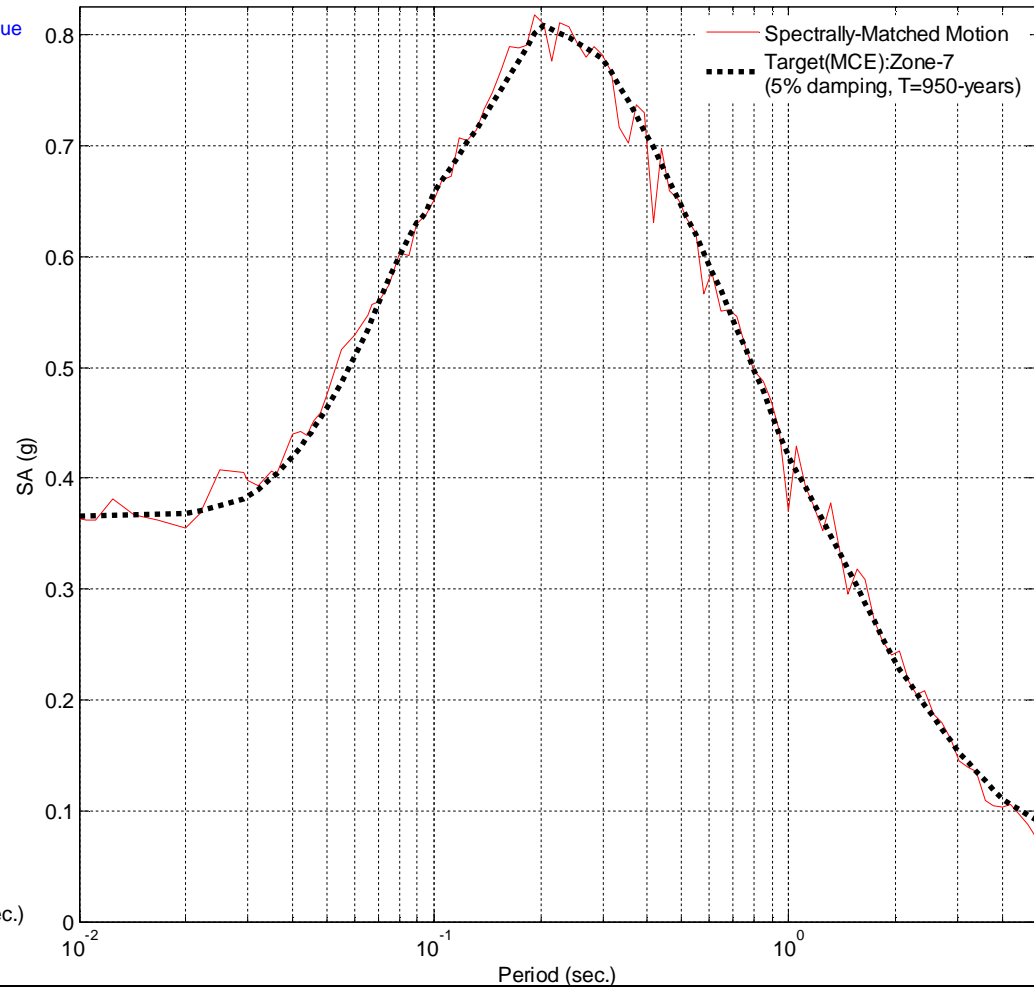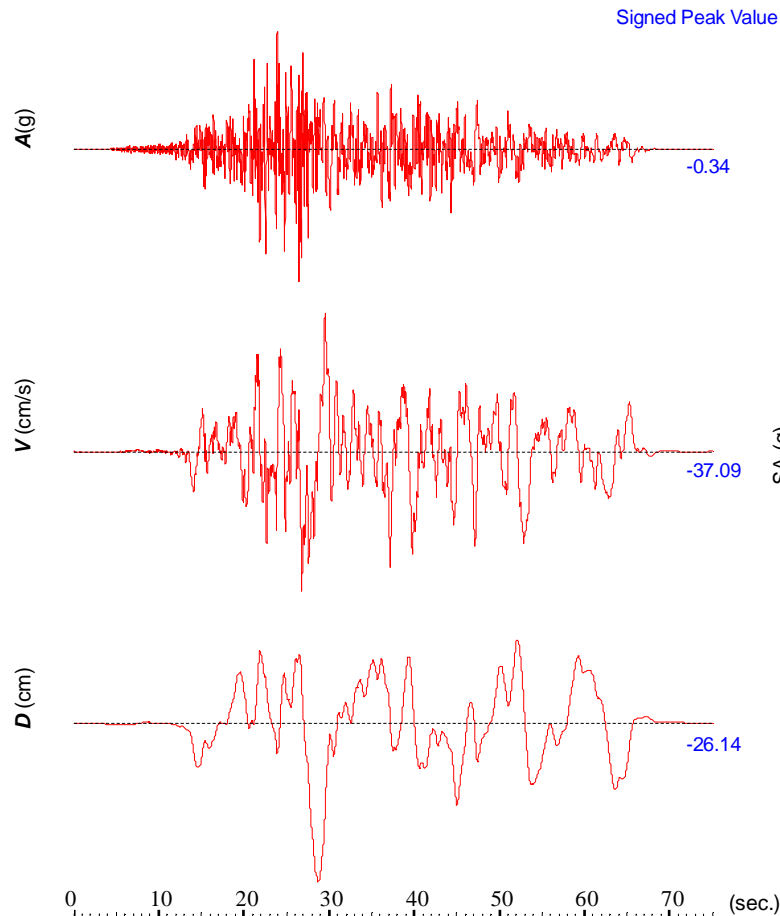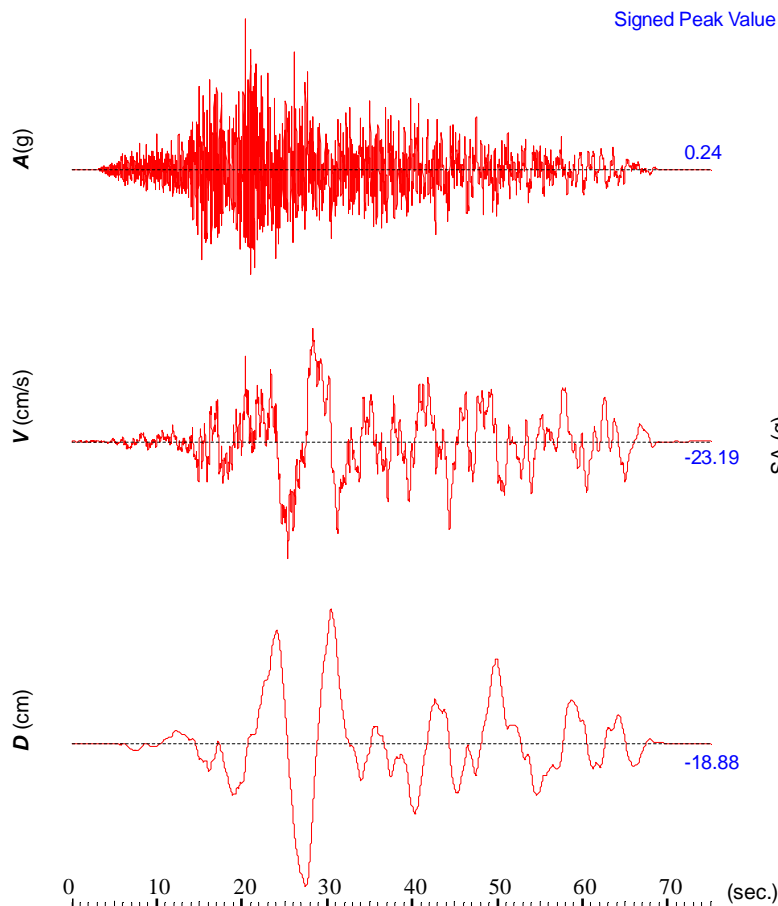| PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 6 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
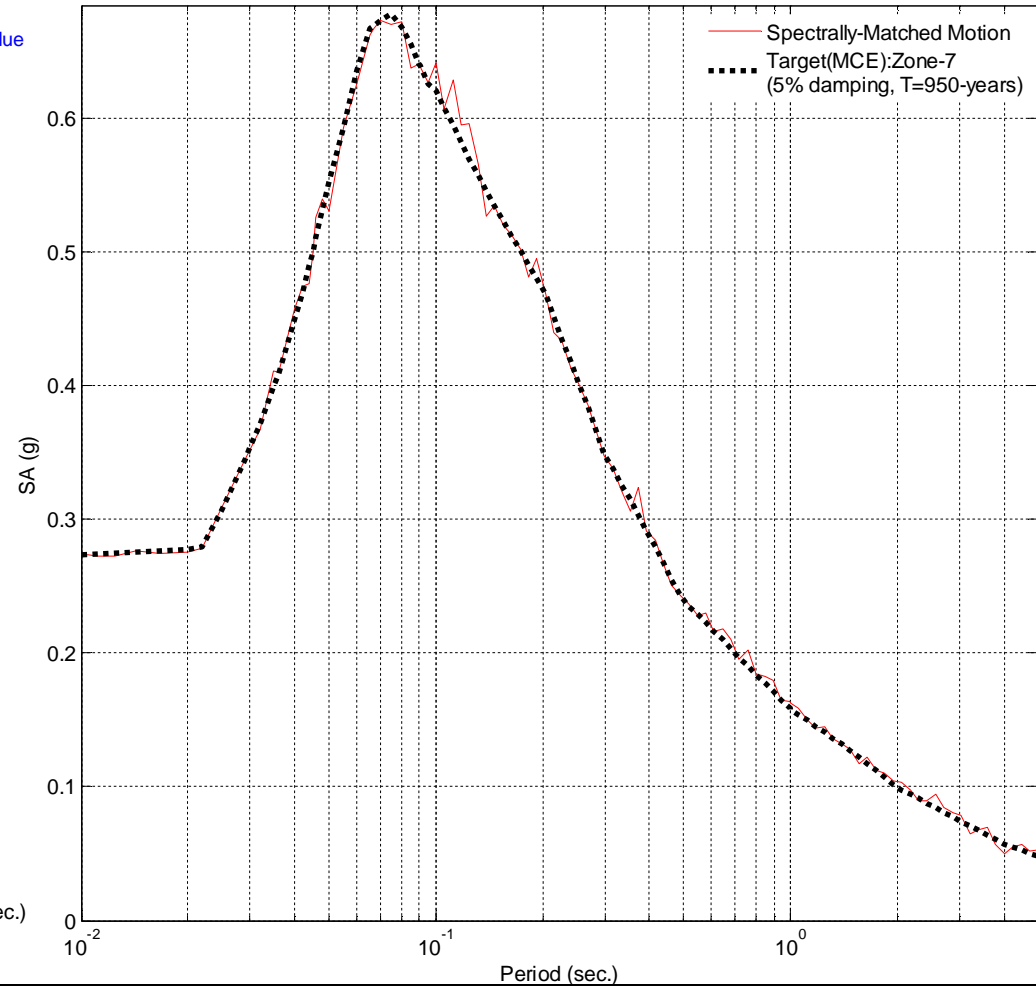FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-16

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A (g)   -0.34

V (cm/s)   -37.09

D (cm)   -26.14

0   10   20   30   40   50   60   70   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1208):Chi-Chi, Taiwan(1999), Station Name:CHY046]

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 6 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**A7-17**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/07/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A(g)   0.24

V (cm/s)   -23.19

D (cm)   -18.88

0   10   20   30   40   50   60   70   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1208):Chi-Chi, Taiwan(1999), Station Name:CHY046]

— Spectrally-Matched Motion
····· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/07/2012

SPECTRALLY-MATCHED
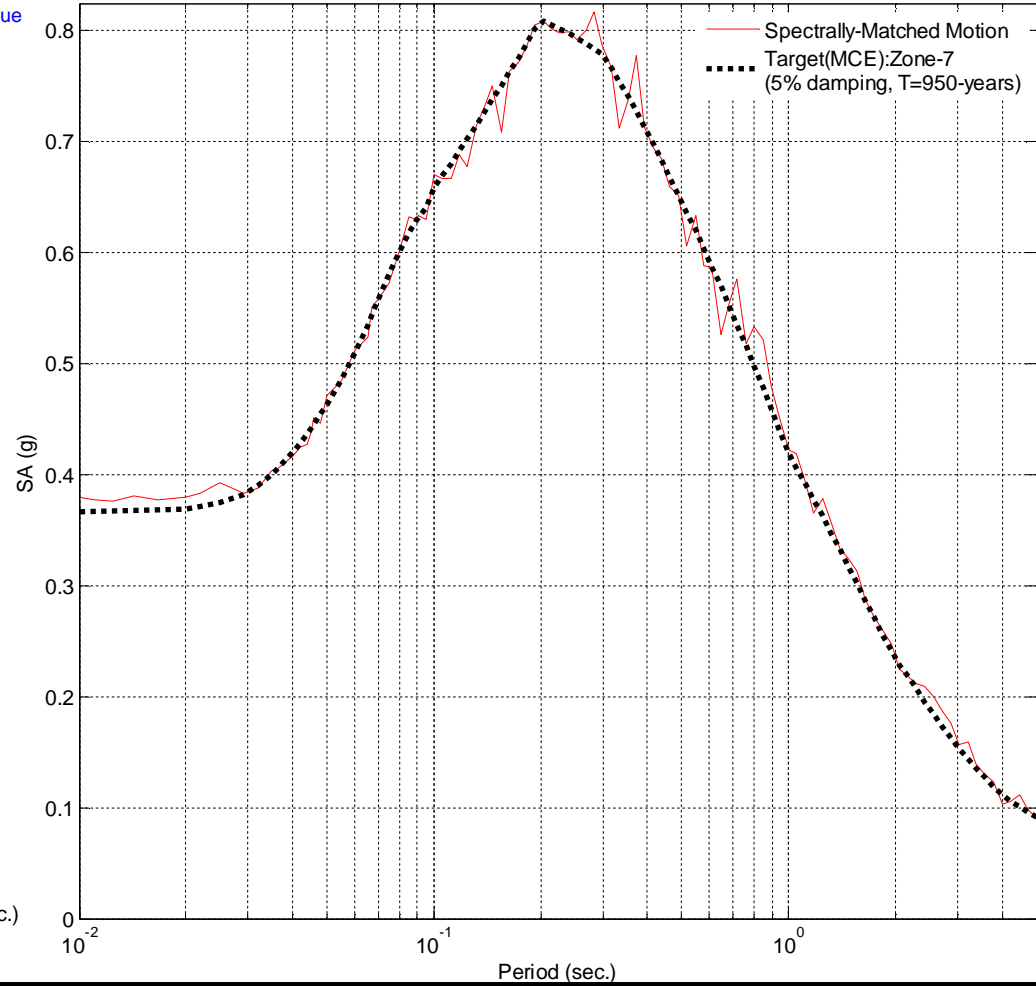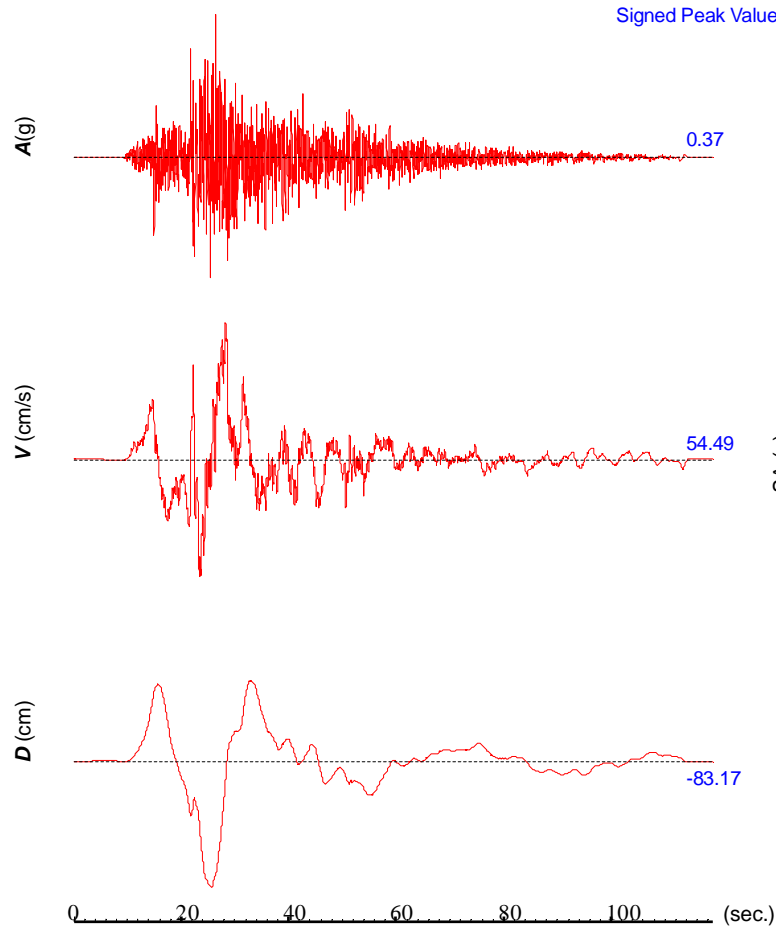MOTIONS – MCE
ZONE 7 – SET NO. 6 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-18

Time Histories for Spectrally-Matched Motion
(H1-Component)

Signed Peak Value

A (g)   0.37

V (cm/s)   54.49

D (cm)   -83.17

0   20   40   60   80   100   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1164):Kocaeli, Turkey(1999), Station Name:Istanbul]

Spectrally-Matched Motion
Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
QA CHECK: V. Jacob
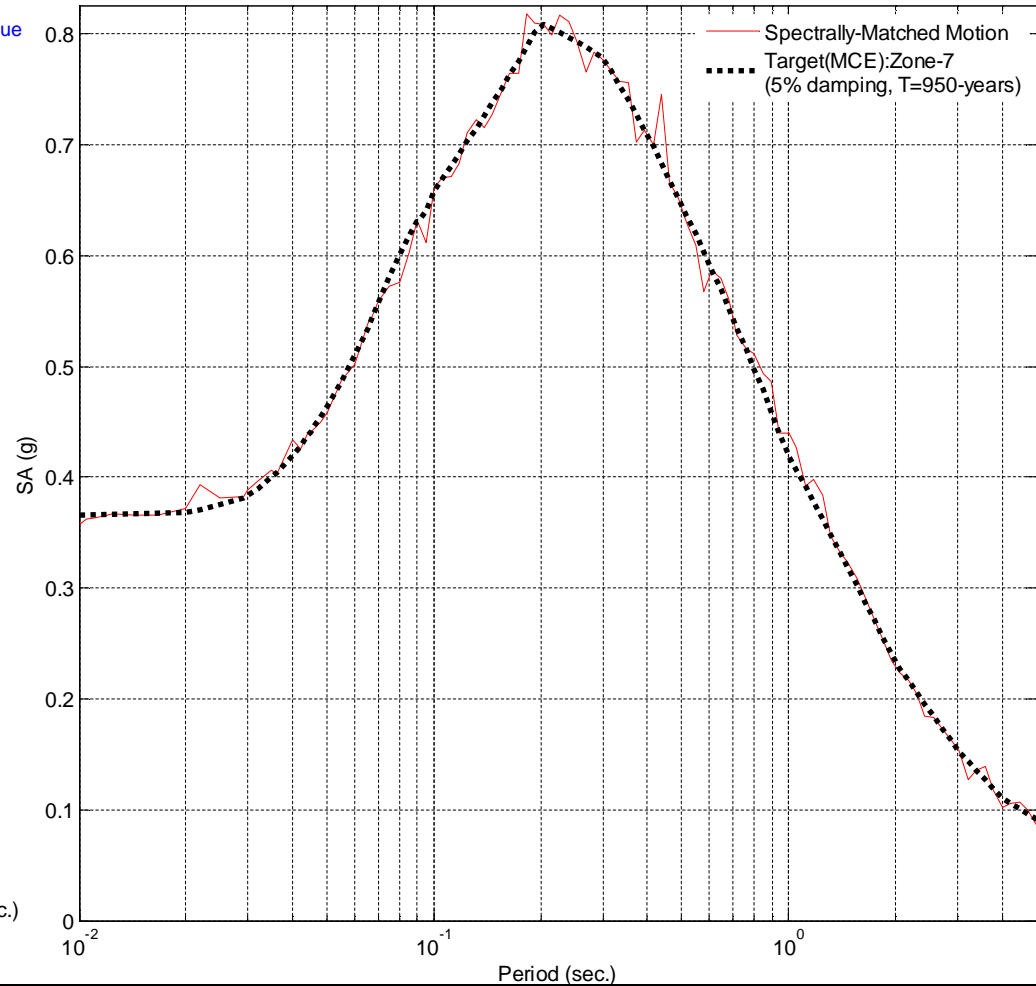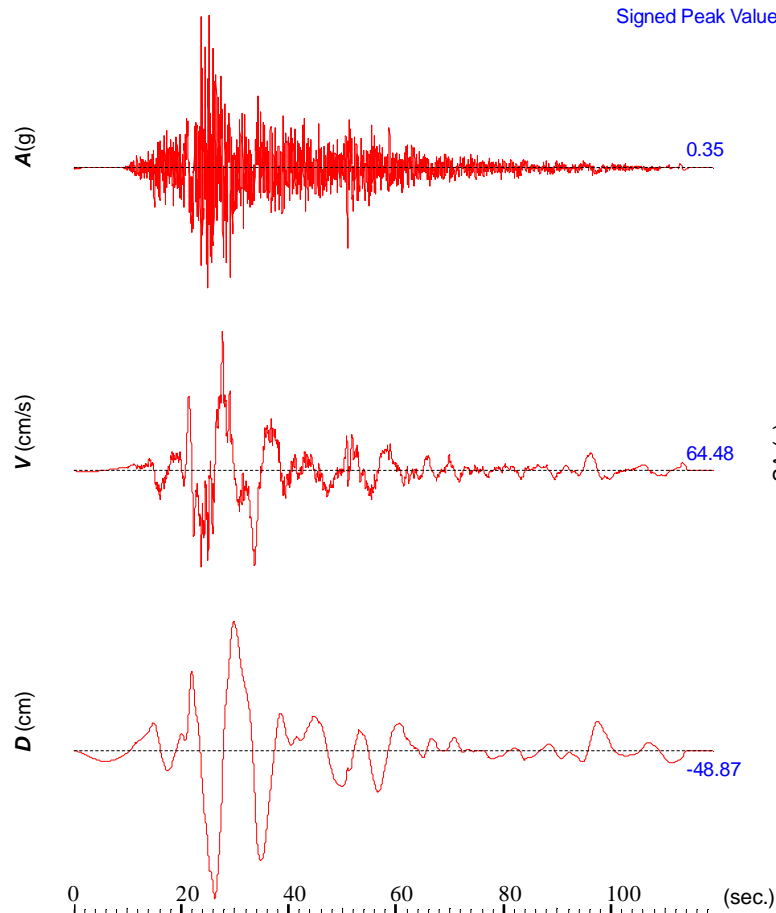DATE: 09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 7 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-19

Time Histories for Spectrally-Matched Motion
(H2-Component)

Signed Peak Value

A(g)

0.35

V (cm/s)

64.48

D (cm)

-48.87

0   20   40   60   80   100   (sec.)

Spectra for Target (MCE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1164):Kocaeli, Turkey(1999), Station Name:Istanbul]

—— Spectrally-Matched Motion

······ Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:
BY: J. Zhong
QC CHECK: M. Perez
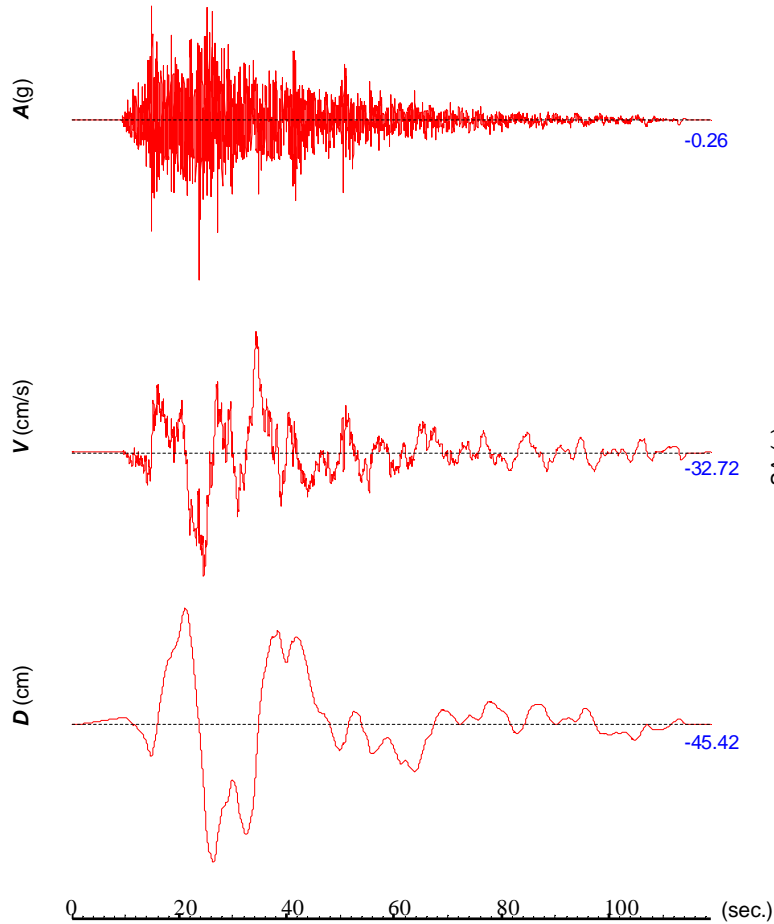QA CHECK: V. Jacob
DATE: 09/07/2012

SPECTRALLY-MATCHED
MOTIONS – MCE
ZONE 7 – SET NO. 7 – HORIZONTAL 2

CALIFORNIA HIGH SPEED TRAIN PROJECT
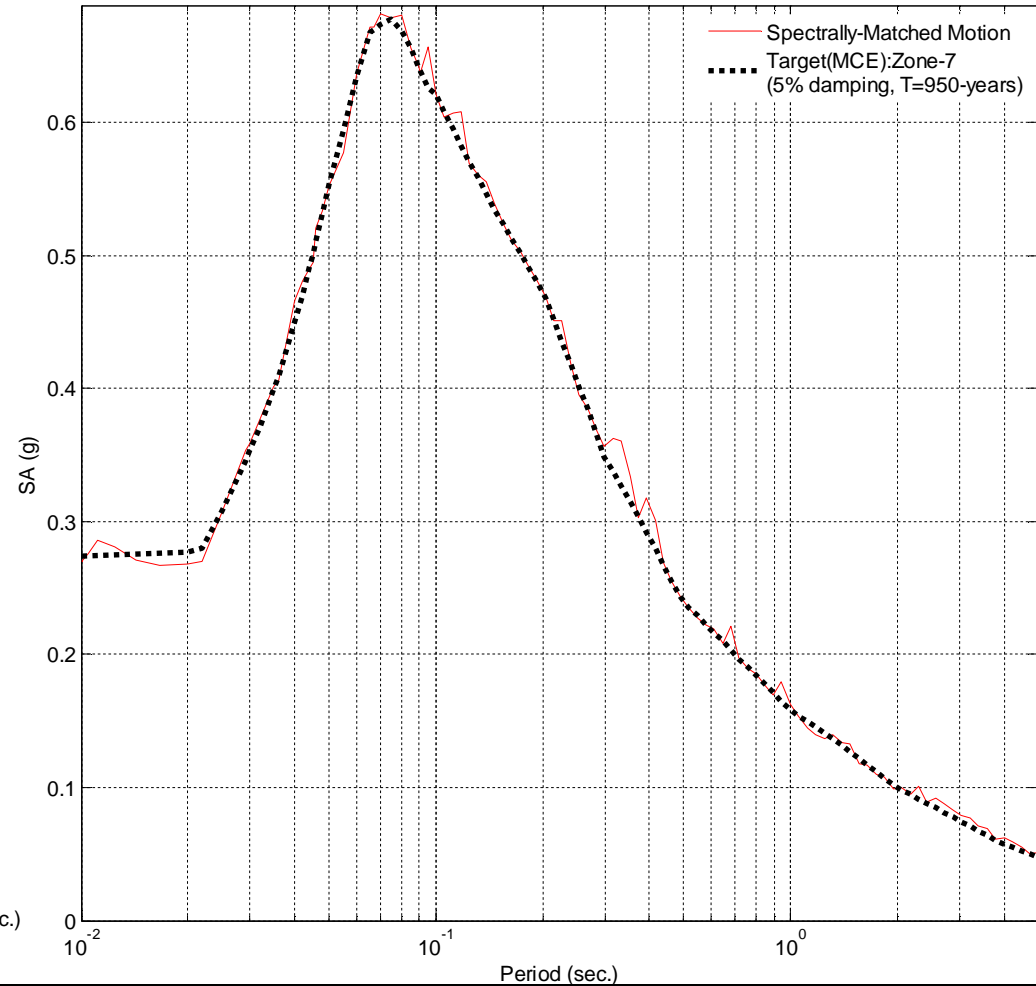FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

A7-20

Time Histories for Spectrally-Matched Motion (V-Component) Signed Peak Value

Spectra for Target (MCE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1164):Kocaeli, Turkey(1999), Station Name:Istanbul]

A(g)

-0.26

V (cm/s)

-32.72

D (cm)

-45.42

0   20   40   60   80   100   (sec.)

— Spectrally-Matched Motion
···· Target(MCE):Zone-7
(5% damping, T=950-years)

SA (g)

0.6

0.5

0.4

0.3

0.2

0.1

10⁻²   10⁻¹   10⁰
Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – MCE ZONE 7 – SET NO. 7 – VERTICAL	PLATE
BY:	J. Zhong		**A7-21**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	09/07/2012		

Table B.7: Ground Motion Metrics for Selected Seed and Spectrally-Matched Motions for **Zone 7**

| Set | NGA # | Selected Seed Motions | | | | | Spectrally-Matched Motions | | | | | | | | |
		Earthquake Name	Year	Station Name	Mw	R	PGA H1 (g)	PGV H1 (cm/s)	PGD H1 (cm)	PGA H2 (g)	PGV H2 (cm/s)	PGD H2 (cm)	PGA V (g)	PGV V (cm/s)	PGD V (cm)
1	832	Landers	1992	Amboy	7.28	69.21	0.107	12.333	11.587	0.105	11.440	4.691	0.066	4.890	2.717
2	1637	Manjil, Iran	1990	Rudsar	7.37	64.47	0.106	8.490	2.724	0.102	11.023	3.185	0.069	3.903	2.071
3	907	Big Bear-01	1992	Hesperia - 4th & Palm	6.46	44.80	0.108	7.920	3.640	0.105	13.090	3.280	0.067	3.721	2.306
4	2112	Denali, Alaska	2002	TAPS Pump Station #08	7.90	104.94	0.107	13.516	6.936	0.104	11.658	8.231	0.059	5.883	4.827
5	882	Landers	1992	North Palm Springs	7.28	26.84	0.105	8.608	3.938	0.105	8.336	4.011	0.063	4.724	2.778
6	1776	Hector Mine	1999	Desert Hot Springs	7.13	56.40	0.103	8.912	6.124	0.104	8.421	4.420	0.067	4.270	2.244
7	2938	Chi-Chi, Taiwan-05	1999	CHY016	6.20	110.34	0.104	11.764	5.022	0.104	8.380	3.805	0.067	5.325	2.248

SC SOLUTIONS

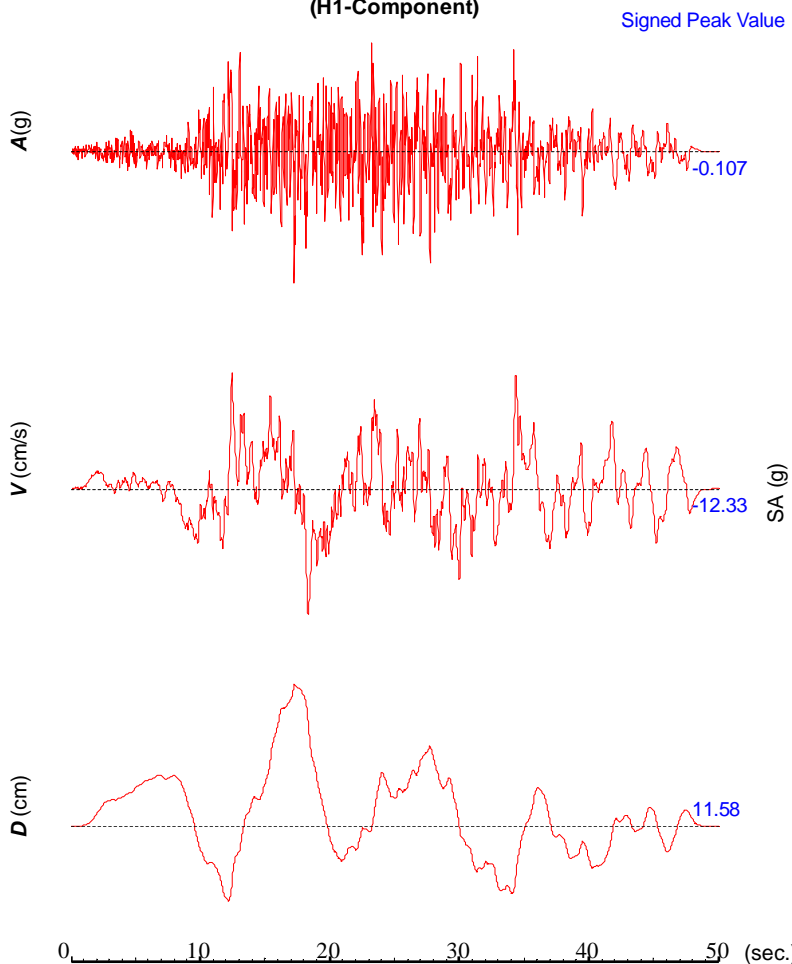|	
PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SELECTED SEED AND
SPECTRALLY-MATCHED MOTIONS
OBE – ZONE 7

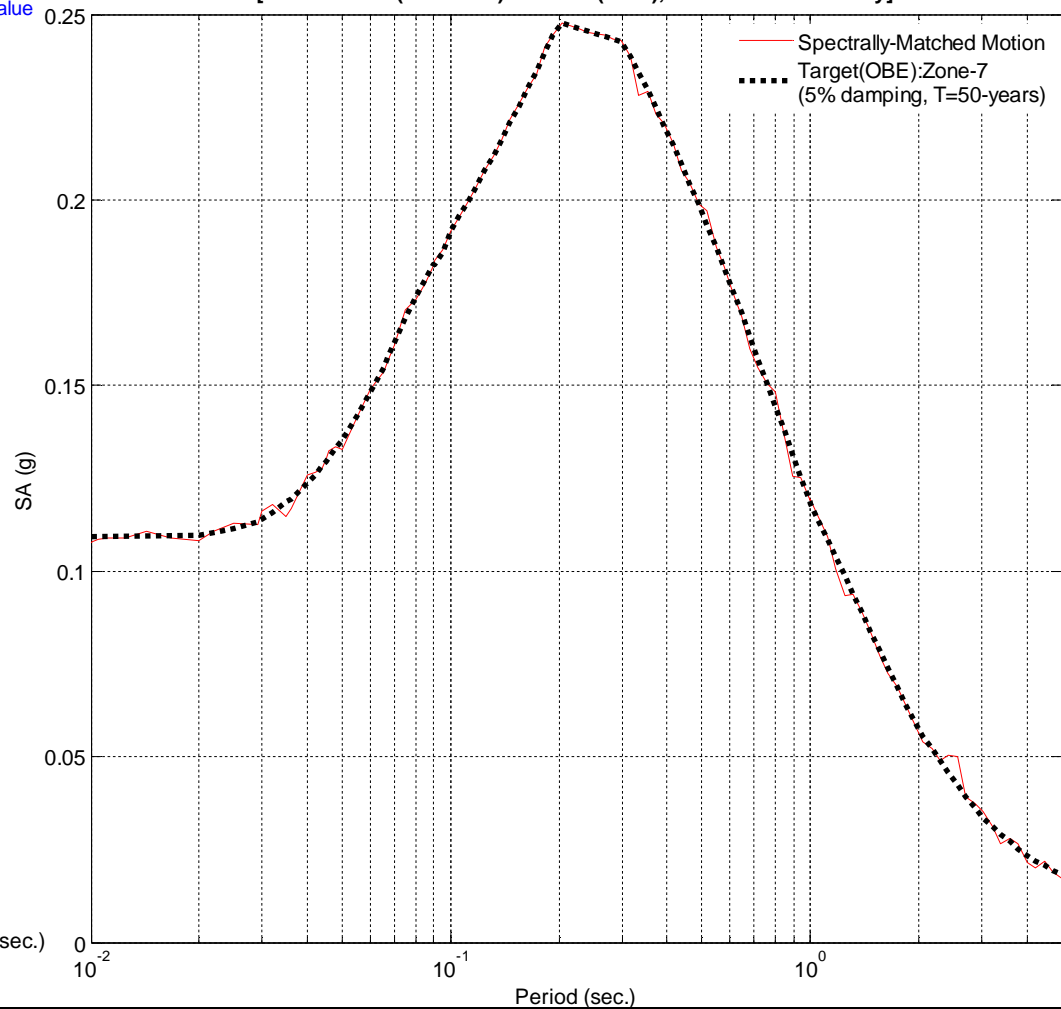CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-0

**Time Histories for Spectrally-Matched Motion
(H1-Component)**

Signed Peak Value

A(g)   -0.107

V (cm/s)   12.33

D (cm)   11.58

0   10   20   30   40   50   (sec.)

**Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#832):Landers(1992), Station Name:Amboy]**

—— Spectrally-Matched Motion
······ Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 1 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
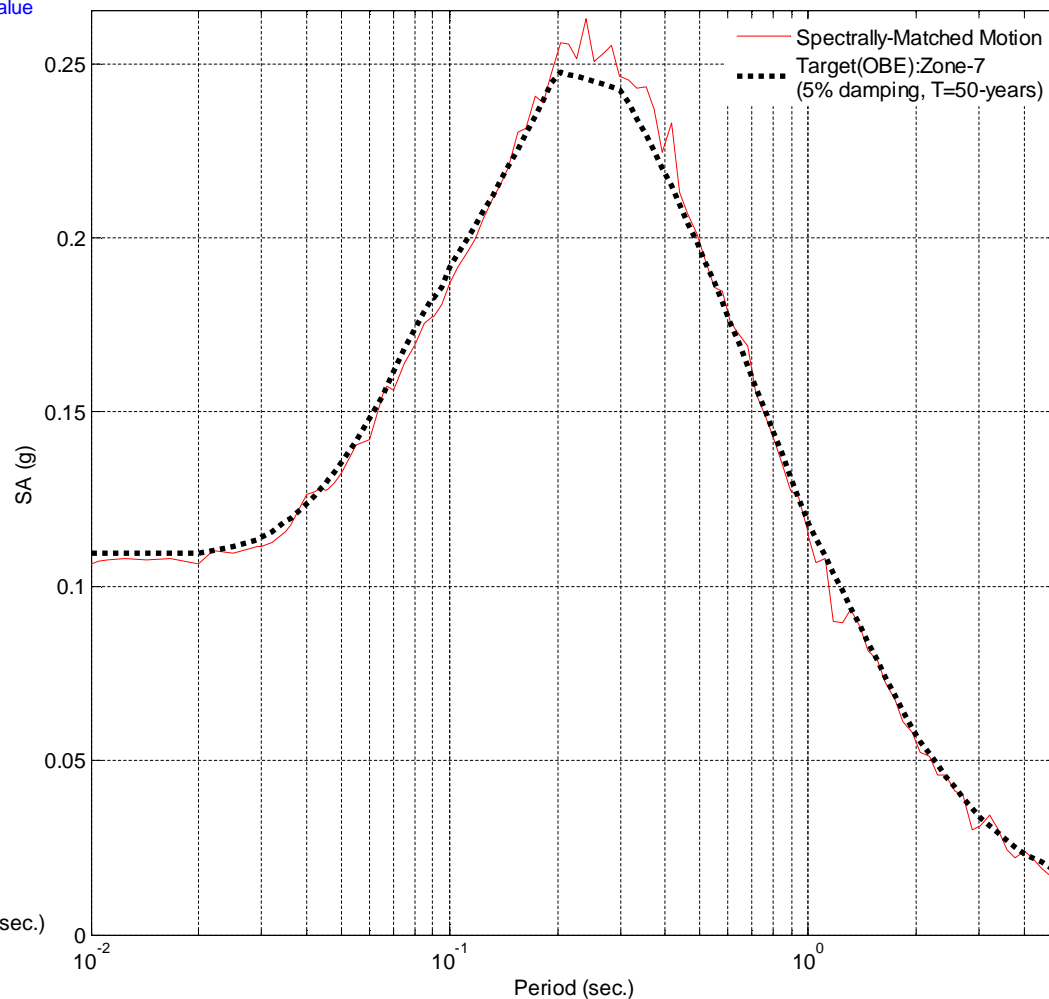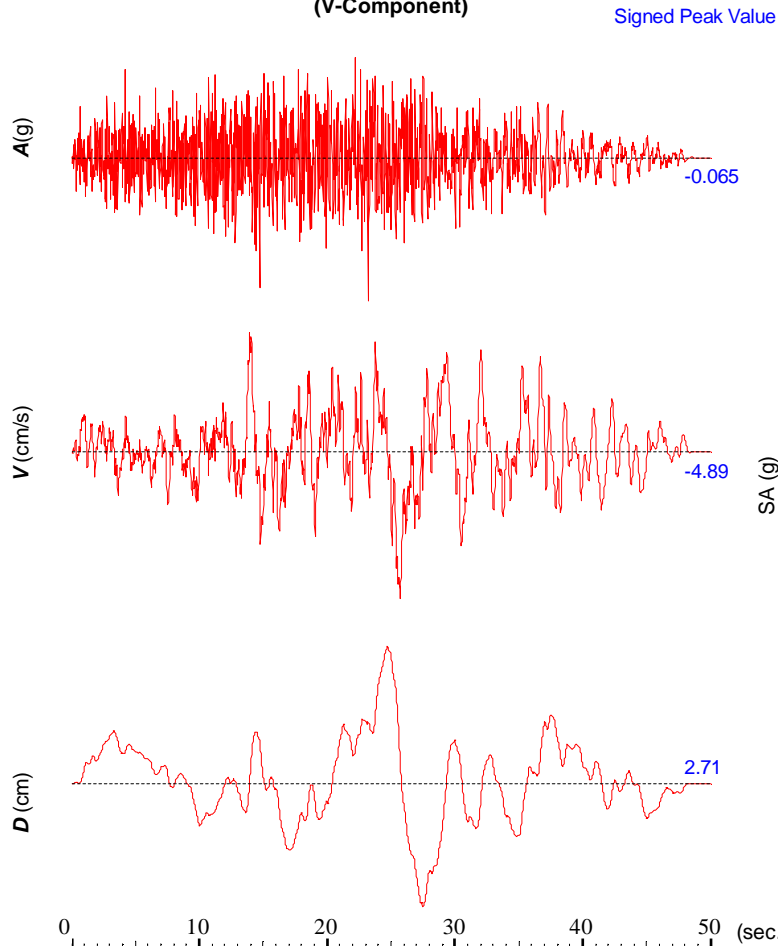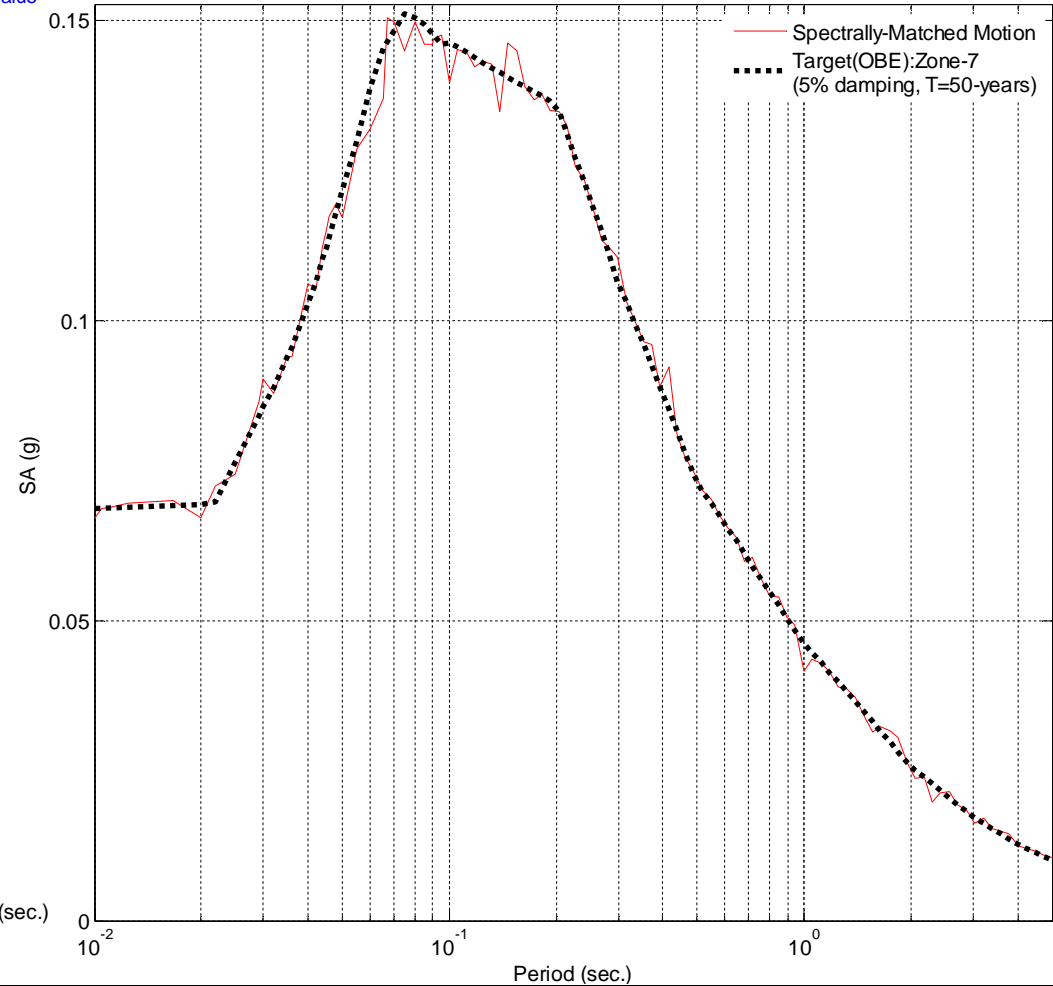FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-1

Time Histories for Spectrally-Matched Motion
(H2-Component)

Signed Peak Value

A(g)   -0.105

V (cm/s)   -11.44

D (cm)   4.69

0   10   20   30   40   50   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#832):Landers(1992), Station Name:Amboy]

—— Spectrally-Matched Motion
······ Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

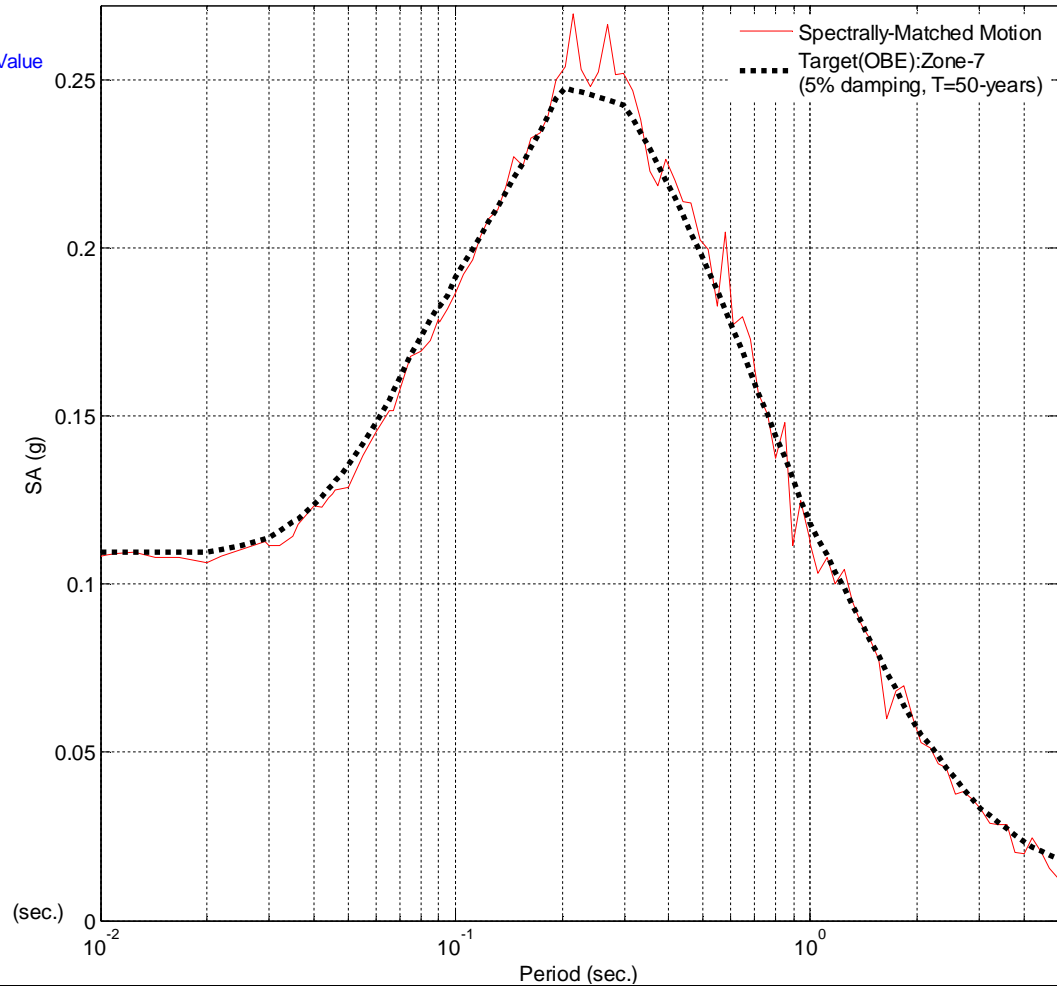| PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 1 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**B7-2**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A(g)   -0.065

V(cm/s)   -4.89

D(cm)   2.71

0   10   20   30   40   50   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#832):Landers(1992), Station Name:Amboy]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
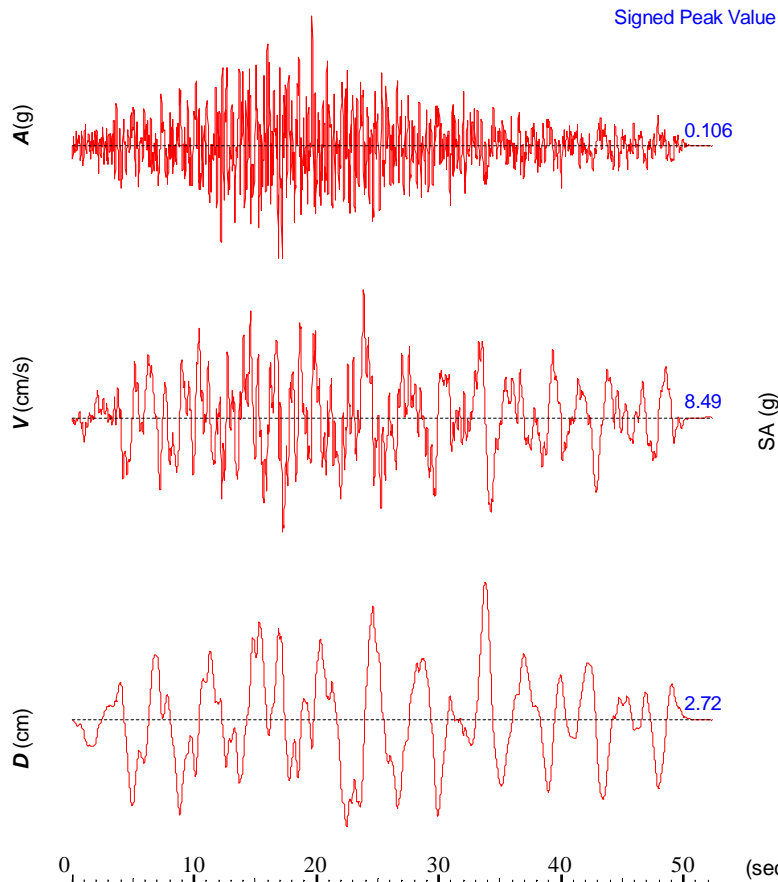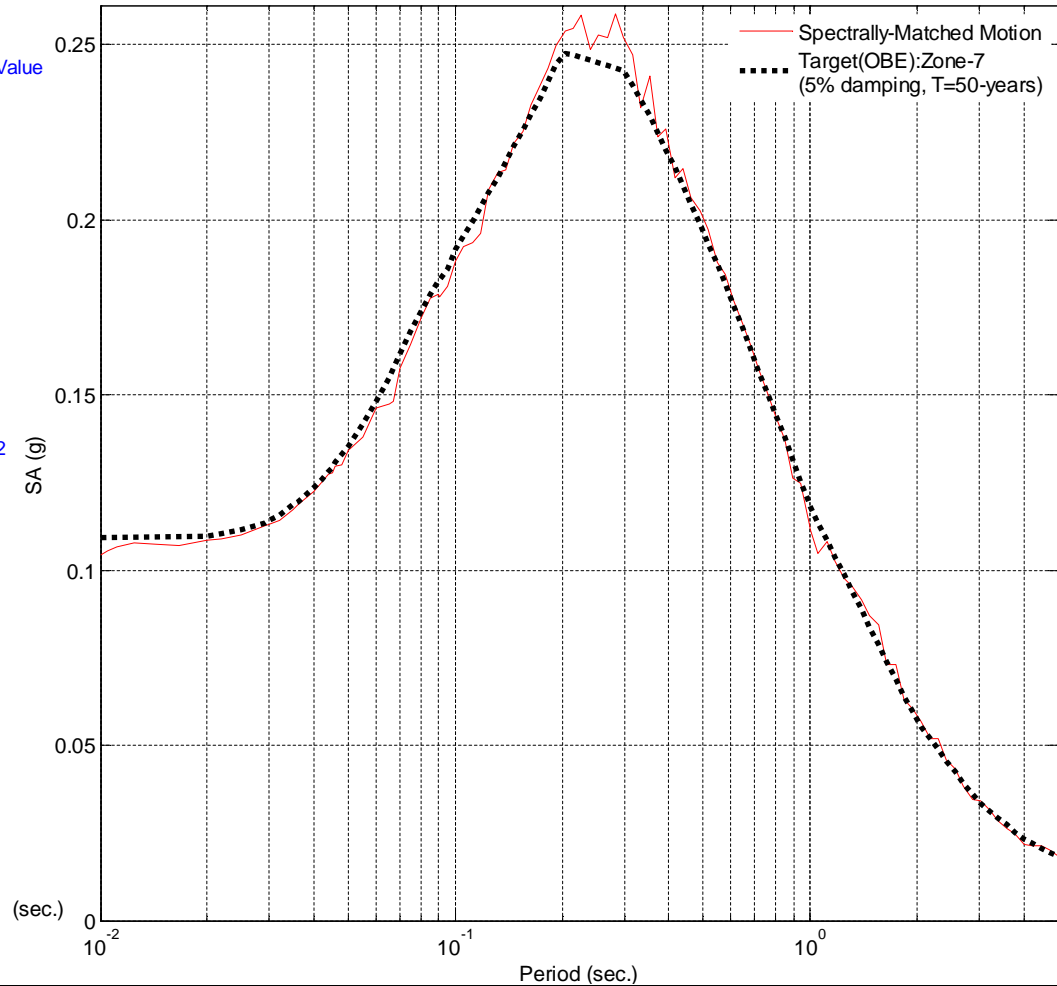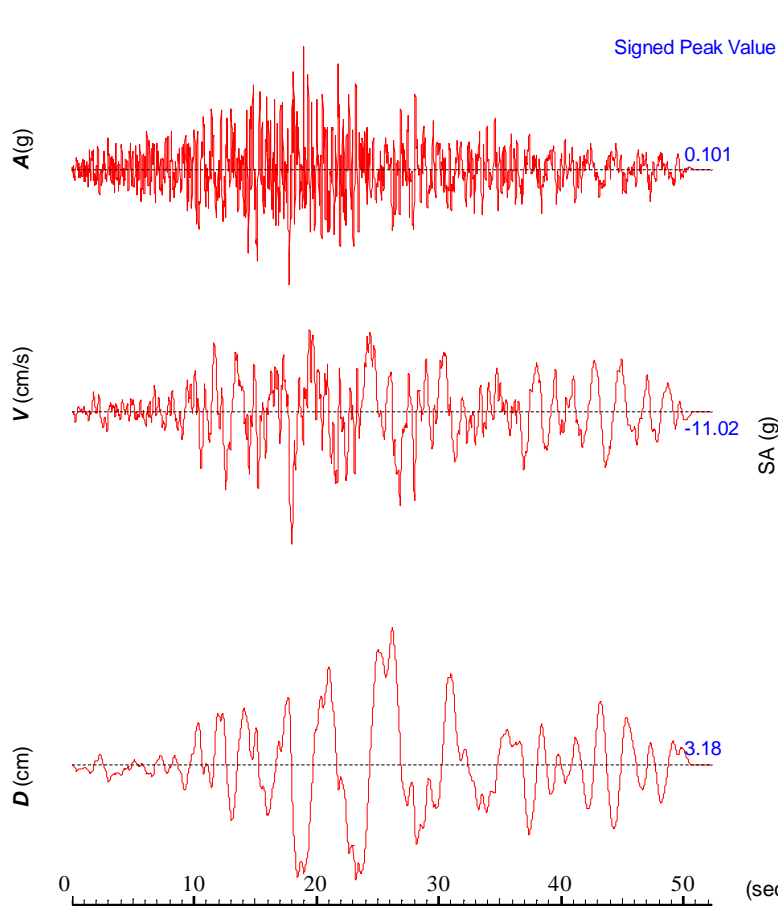MOTIONS – OBE
ZONE 7 – SET NO. 1 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-3

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A (g) — 0.106

V (cm/s) — 8.49

D (cm) — 2.72

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

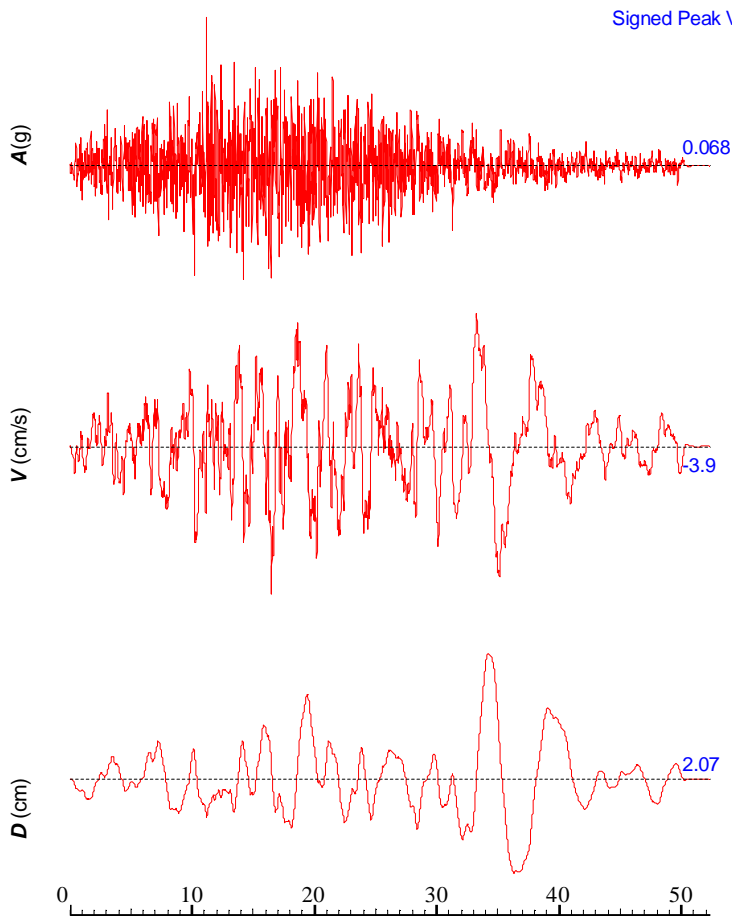| PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 2 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
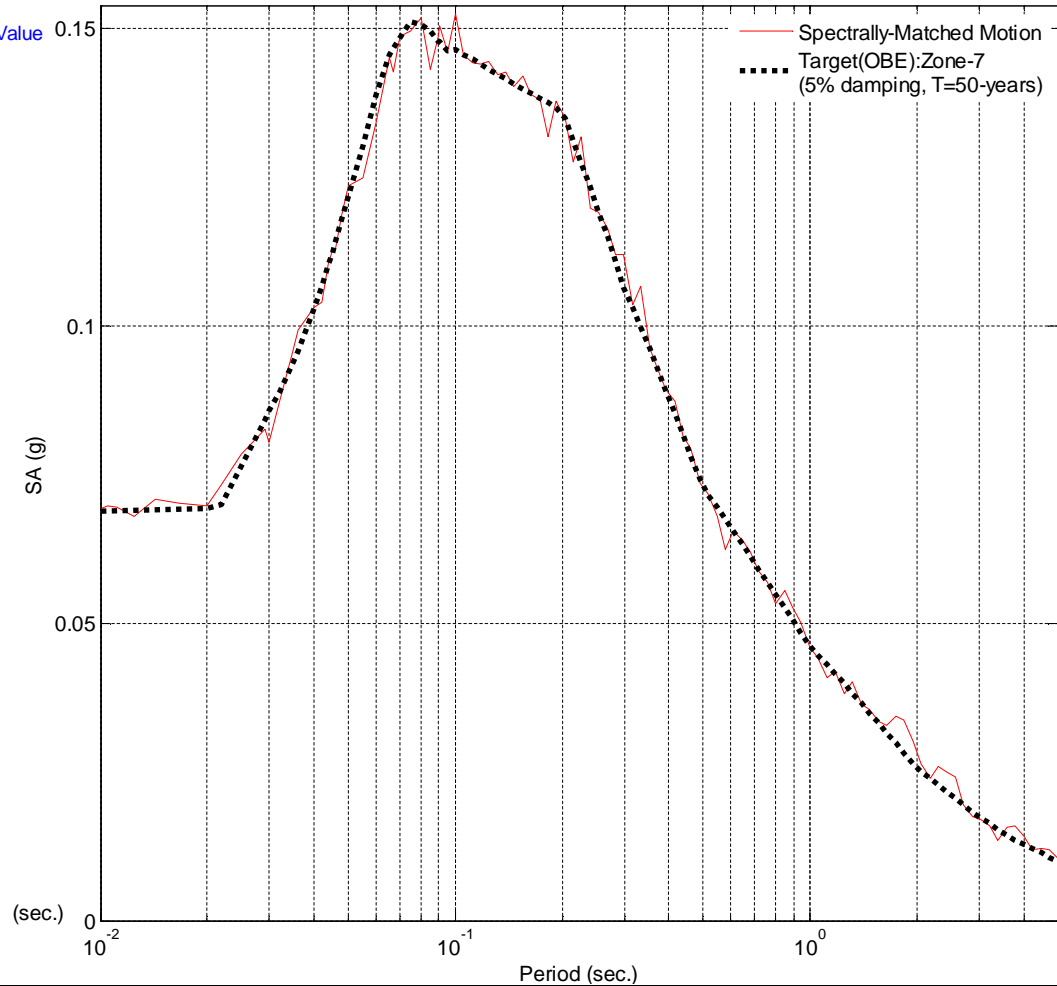FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-4

Time Histories for Spectrally-Matched Motion (H2-Component)

Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]

Signed Peak Value

A(g)   0.101
V (cm/s)   -11.02
D (cm)   3.18

SA (g)

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

Period (sec.)
(sec.)

SC SOLUTIONS	PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 2 – HORIZONTAL 2	PLATE
	BY:	J. Zhong		**B7-5**
	QC CHECK:	M. Perez		
	QA CHECK:	V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
	DATE:	09/13/2012		

Time Histories for Spectrally-Matched Motion (V-Component)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1637):Manjil, Iran(1990), Station Name:Rudsar]

Signed Peak Value

- Spectrally-Matched Motion
- Target(OBE):Zone-7 (5% damping, T=50-years)

A(g) 0.068
V (cm/s) -3.9
D (cm) 2.07

Period (sec.)

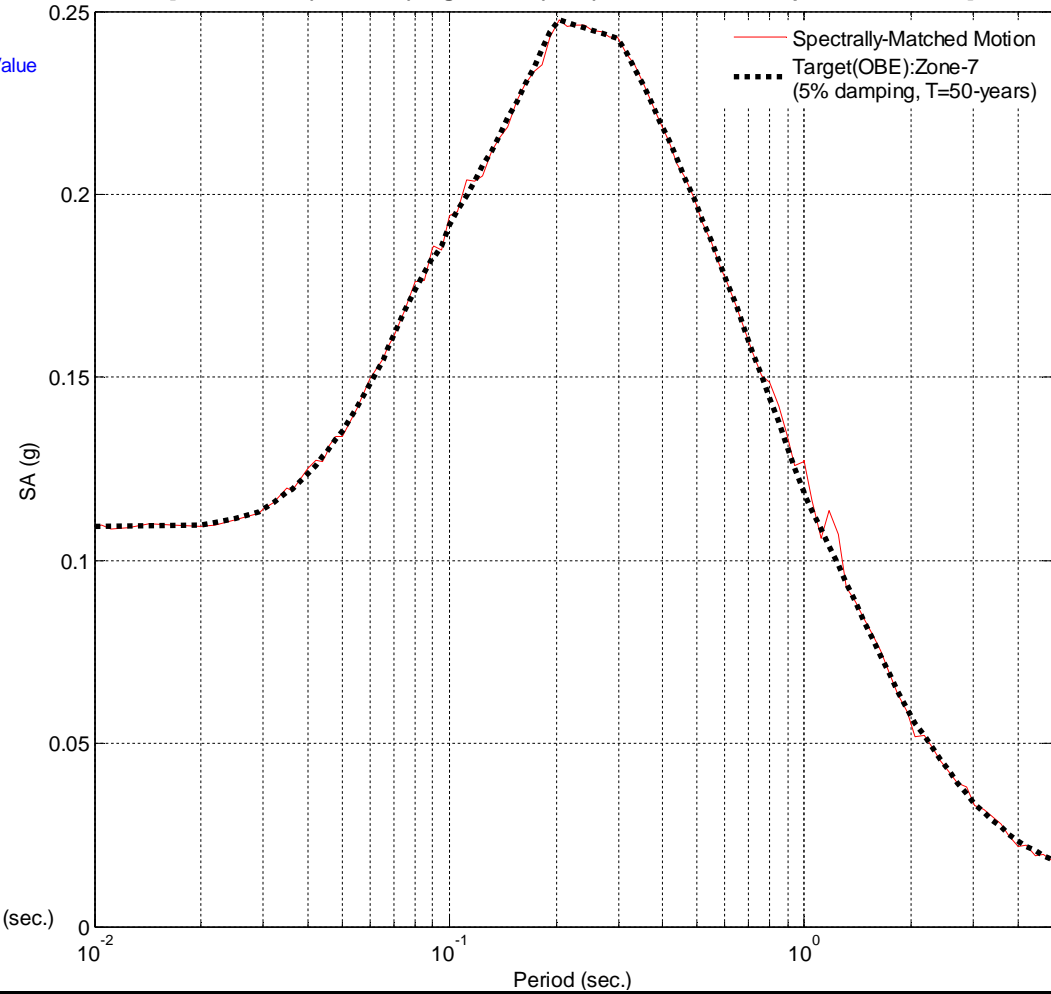| SC SOLUTIONS	PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 2 – VERTICAL	PLATE
	BY:	J. Zhong		**B7-6**
	QC CHECK:	M. Perez		
	QA CHECK:	V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
	DATE:	09/13/2012		

Time Histories for Spectrally-Matched Motion
(H1-Component)

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
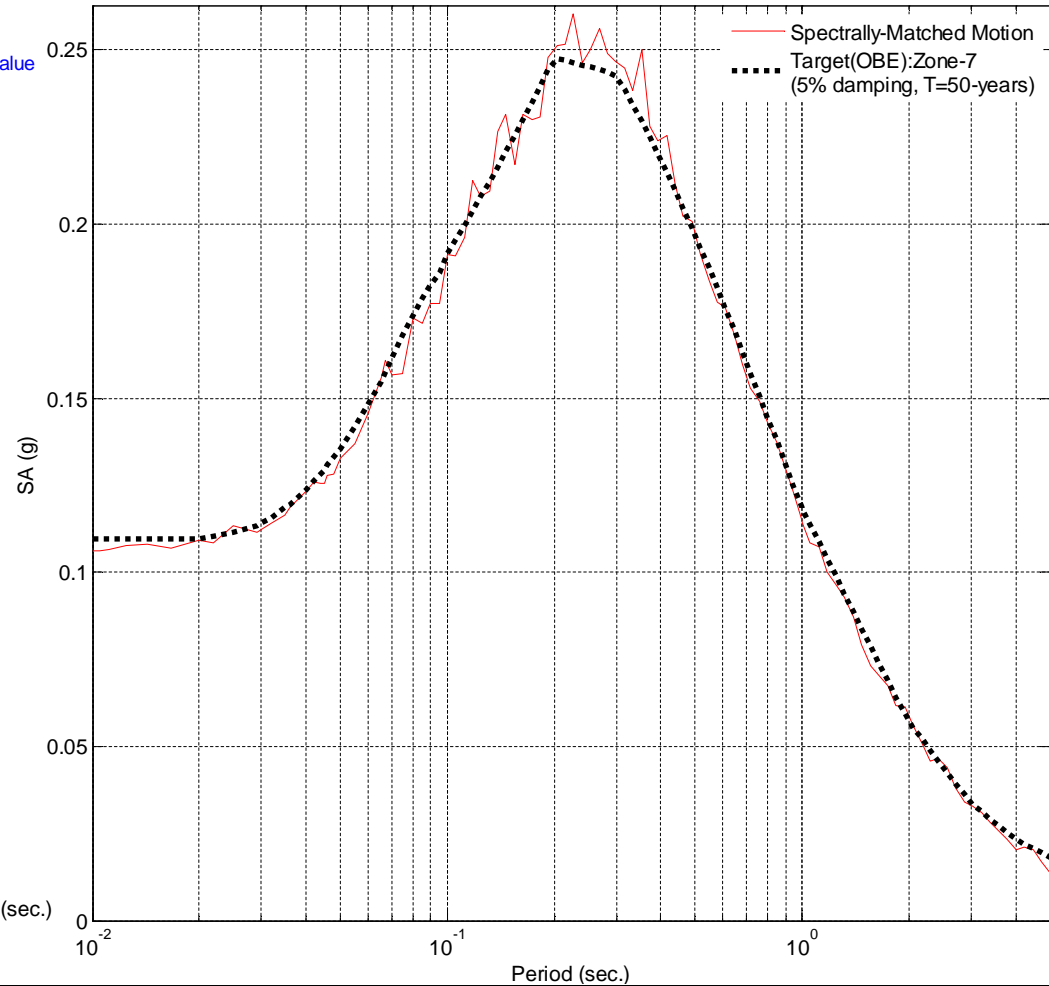**[Seed Motion (NGA#907):Big Bear 01(1992), Station Name:Hesperia - 4th & Palm]**

Signed Peak Value

A(g)

0.107

V (cm/s)

7.92

D (cm)

-3.64

0   10   20   30   40   50   60   (sec.)

SA (g)

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

0.25

0.2

0.15

0.1

0.05

0

10^{-2} 10^{-1} 10^{0}

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 3 – HORIZONTAL 1	PLATE
BY:	J. Zhong		**B7-7**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A(g)   0.104

V (cm/s)   13.09

D (cm)   3.27

0   10   20   30   40   50   60   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#907):Big Bear 01(1992), Station Name:Hesperia - 4th & Palm]

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 3 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**B7-8**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A (g)   -0.066

V (cm/s)   -3.72

D (cm)   -2.3

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#907):Big Bear 01(1992), Station Name:Hesperia - 4th & Palm]

— Spectrally-Matched Motion
····· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS	PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 3 – VERTICAL	PLATE
	BY:	J. Zhong		**B7-9**
	QC CHECK:	M. Perez		
	QA CHECK:	V. Jacob		
	DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A (g)   -0.106

V (cm/s)   -13.51

D (cm)   -6.93

0   10   20   30   40   50   60   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 4 – HORIZONTAL 1

CALIFORNIA HIGH SPEED TRAIN PROJECT
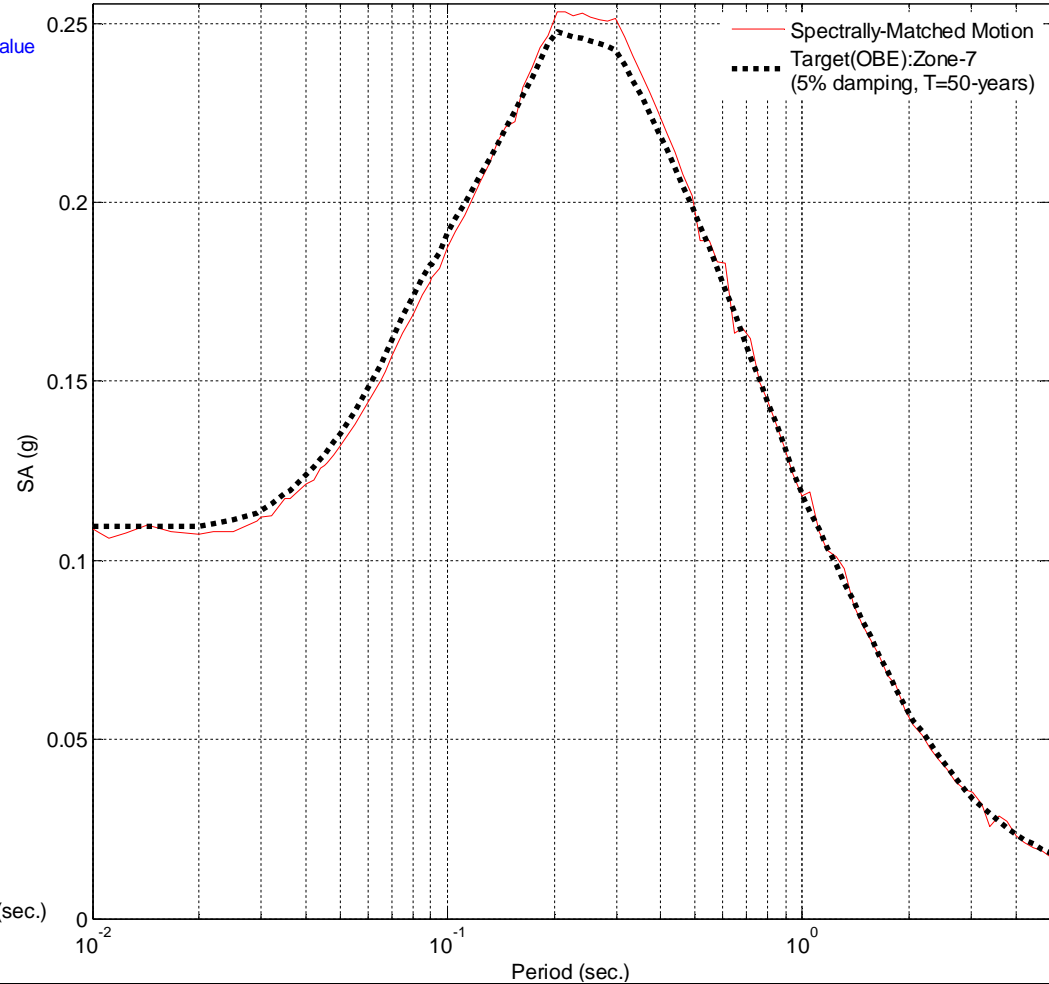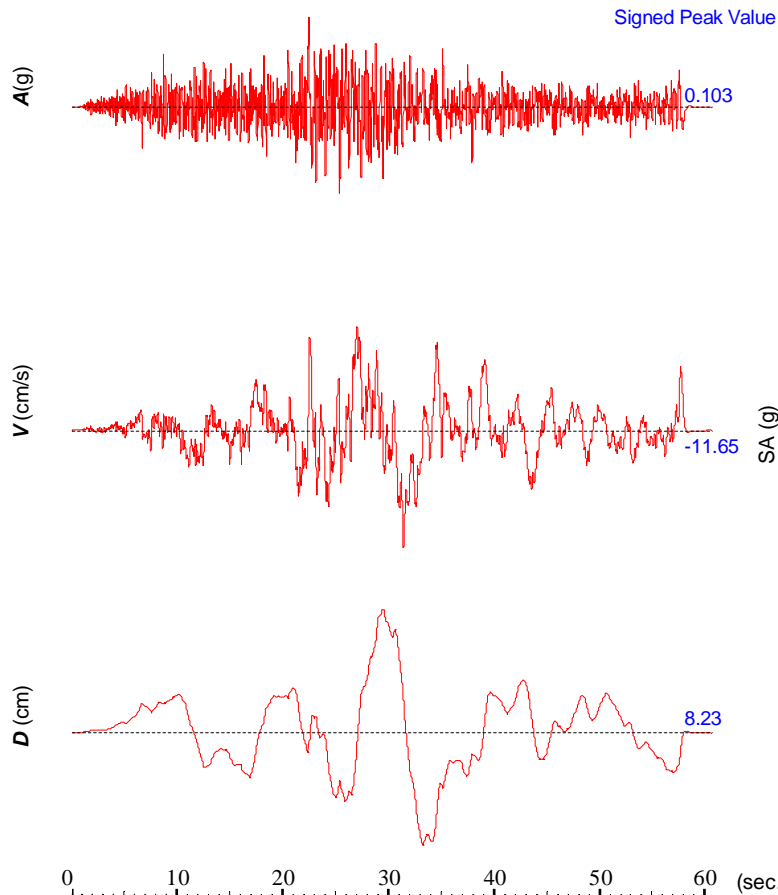FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-10

Time Histories for Spectrally-Matched Motion
(H2-Component)

Signed Peak Value

A(g)   0.103

V(cm/s)   -11.65

D(cm)   8.23

0   10   20   30   40   50   60   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

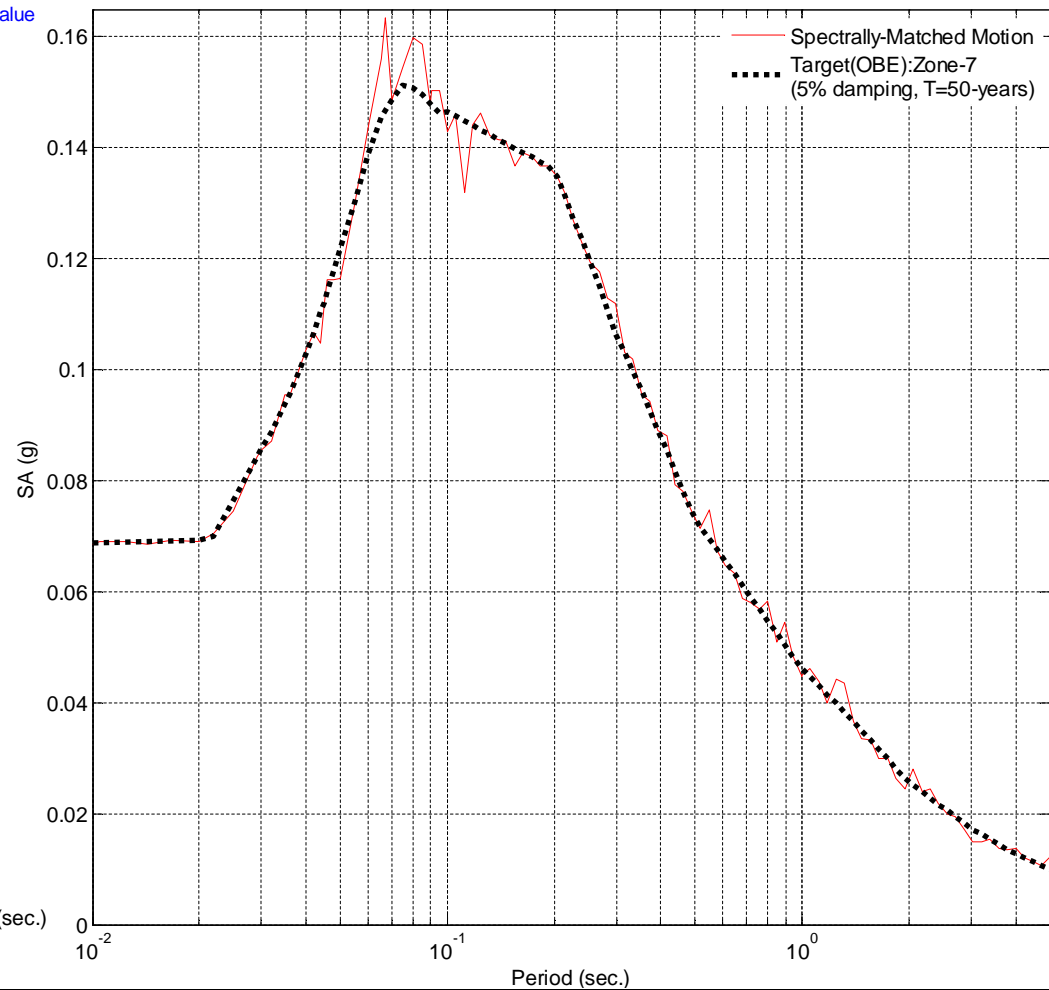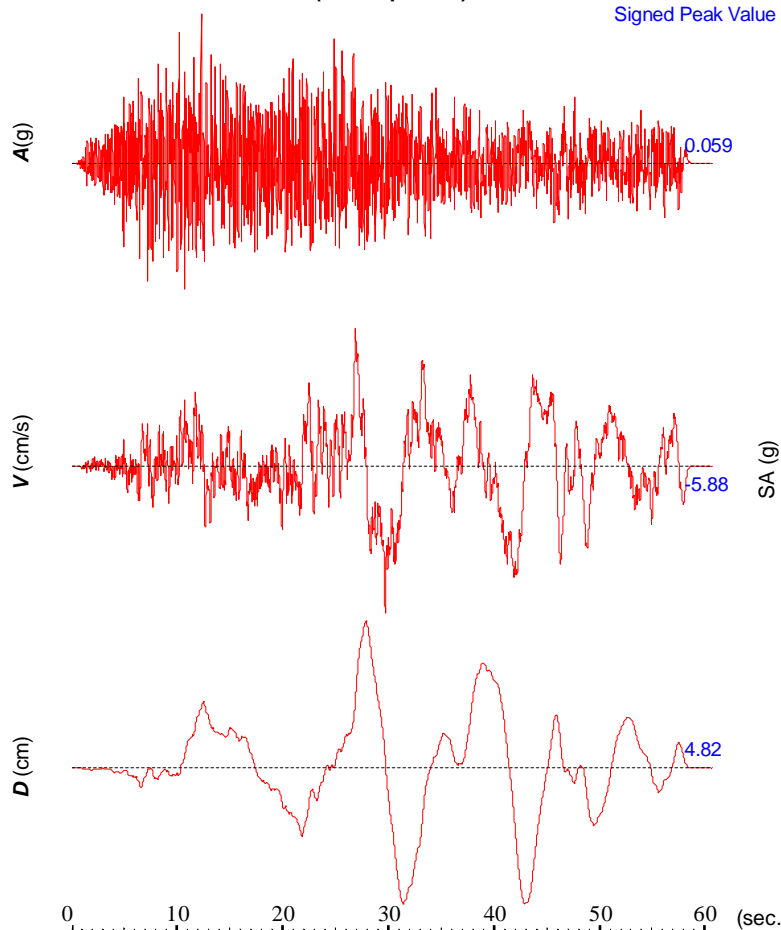| PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 4 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**B7-11**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

A(g)   Signed Peak Value   0.059

V(cm/s)   -5.88

D(cm)   4.82

0   10   20   30   40   50   60   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#2112):Denali, Alaska(2002), Station Name:TAPS Pump Station #08]

— Spectrally-Matched Motion
••• Target(OBE):Zone-7 (5% damping, T=50-years)

SA (g)

Period (sec.)

		PLATE
SC SOLUTIONS	PROJ. NO:	
	BY: J. Zhong	SPECTRALLY-MATCHED
	QC CHECK: M. Perez	MOTIONS – OBE
	QA CHECK: V. Jacob	ZONE 7 – SET NO. 4 – VERTICAL
	DATE: 09/13/2012	**B7-12**
		CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA

Time Histories for Spectrally-Matched Motion
(H1-Component)

Signed Peak Value

A (g)

-0.105

V (cm/s)

8.6

D (cm)

-3.93

0   10   20   30   40   50   60   70 (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

— Spectrally-Matched Motion
······ Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

		PLATE
PROJ. NO:	SPECTRALLY-MATCHED	
BY: J. Zhong	MOTIONS – OBE	**B7-13**
QC CHECK: M. Perez	ZONE 7 – SET NO. 5 – HORIZONTAL 1	
QA CHECK: V. Jacob		
DATE: 09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

SC SOLUTIONS

Time Histories for Spectrally-Matched Motion (H2-Component)

Signed Peak Value

A (g) -0.104

V (cm/s) 8.33

D (cm) -4.01

0 10 20 30 40 50 60 70 (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

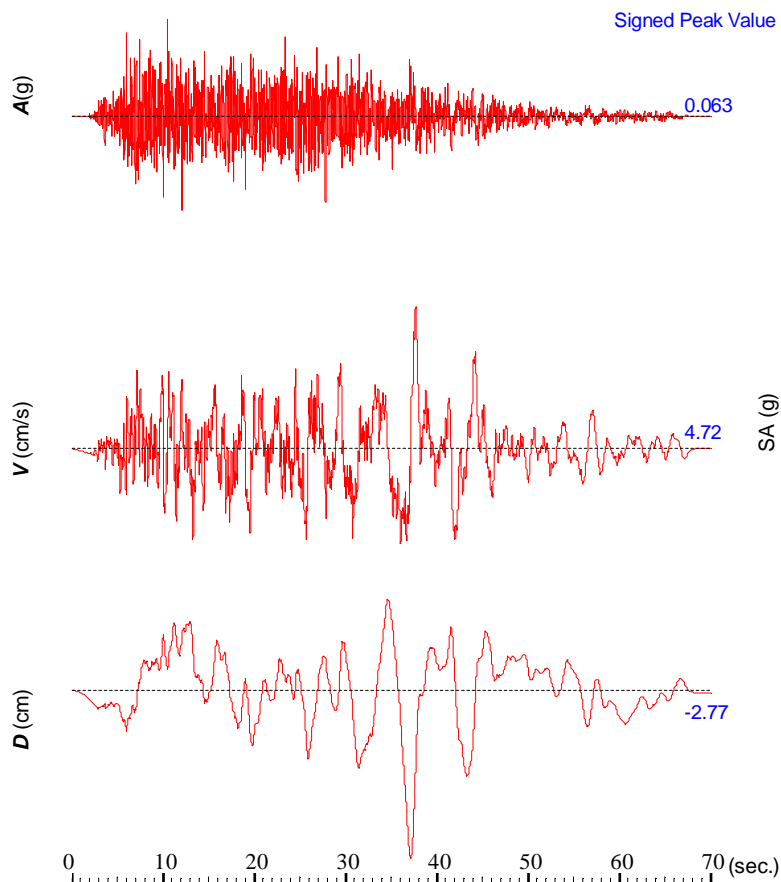|		
PROJ. NO:		
BY:	J. Zhong	
QC CHECK:	M. Perez	
QA CHECK:	V. Jacob	
DATE:	09/13/2012	

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 5 – HORIZONTAL 2

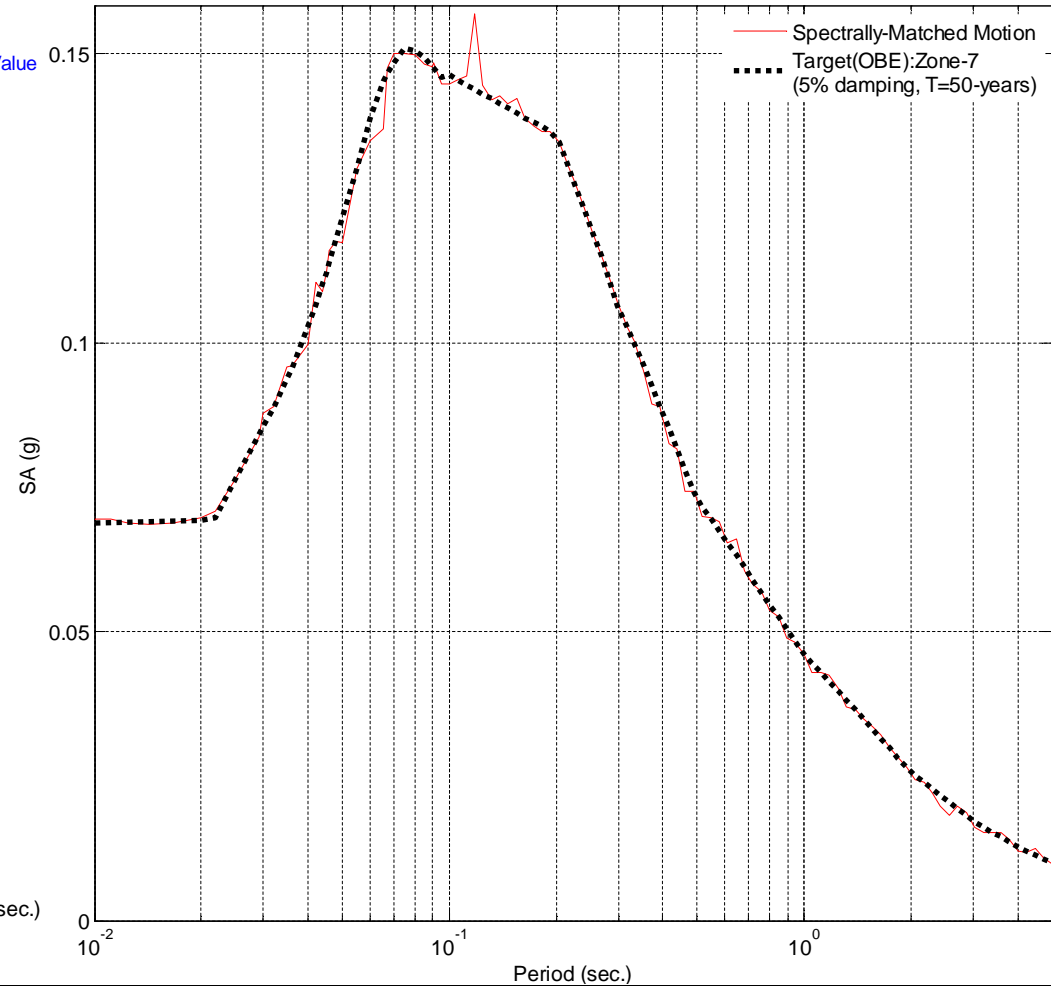CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-14

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A(g)   0.063

V (cm/s)   4.72

D (cm)   -2.77

0   10   20   30   40   50   60   70 (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#882):Landers(1992), Station Name:North Palm Springs]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

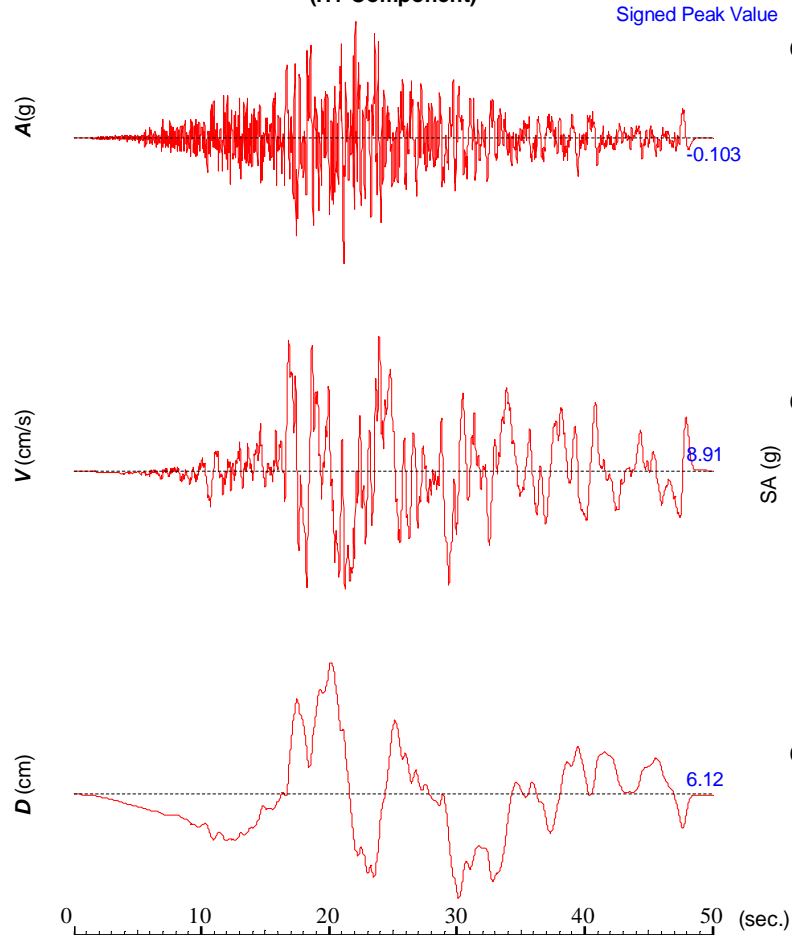| PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 5 – VERTICAL

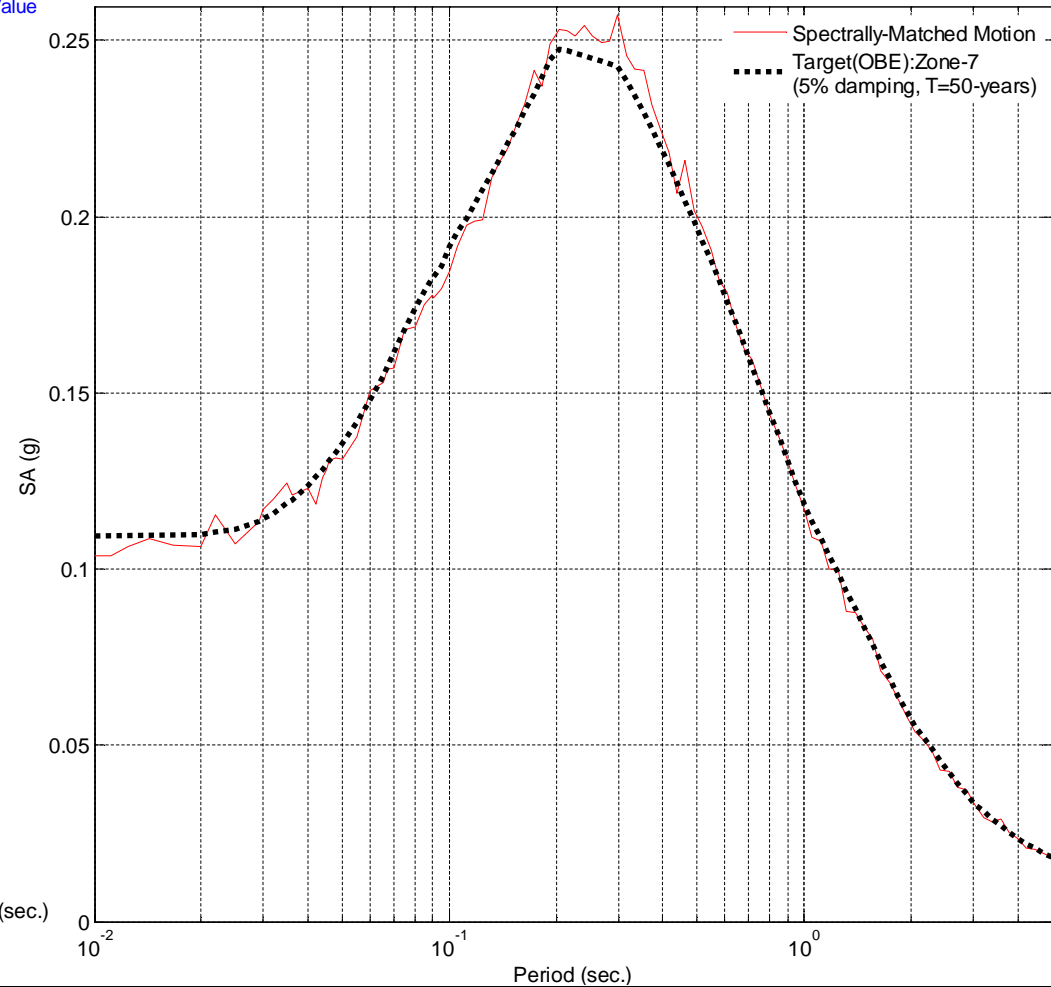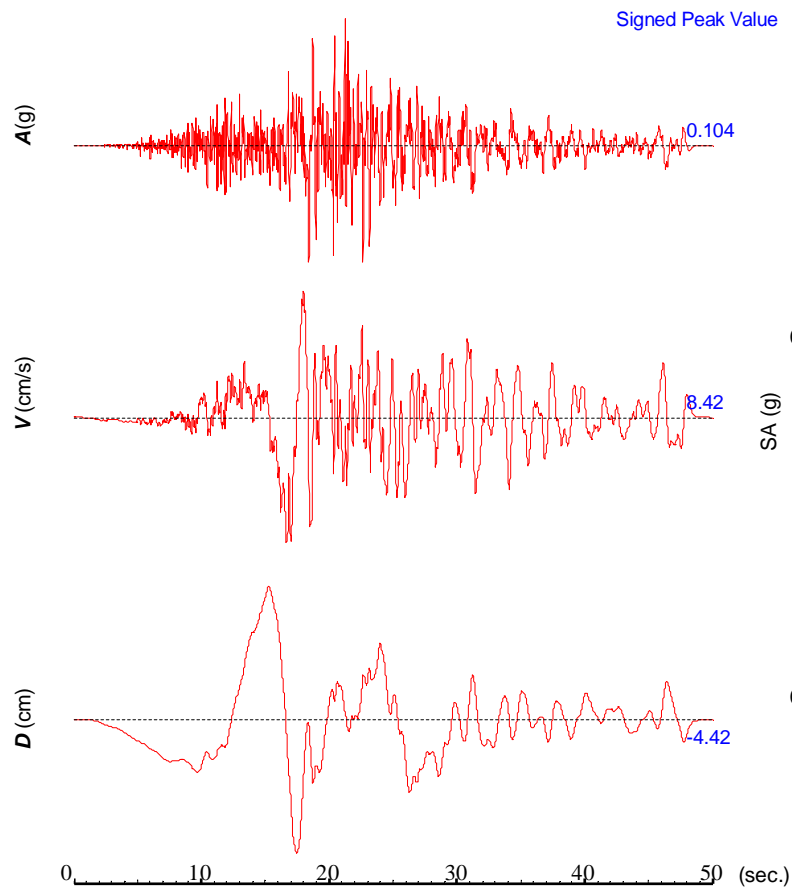CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-15

Time Histories for Spectrally-Matched Motion (H1-Component)

Signed Peak Value

A(g)   -0.103

V (cm/s)   8.91

D (cm)   6.12

0   10   20   30   40   50   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#1776):Hector Mine(1999), Station Name:Desert Hot Springs]

—— Spectrally-Matched Motion
····· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

0.25
0.2
0.15
0.1
0.05

10⁻²   10⁻¹   10⁰

Period (sec.)

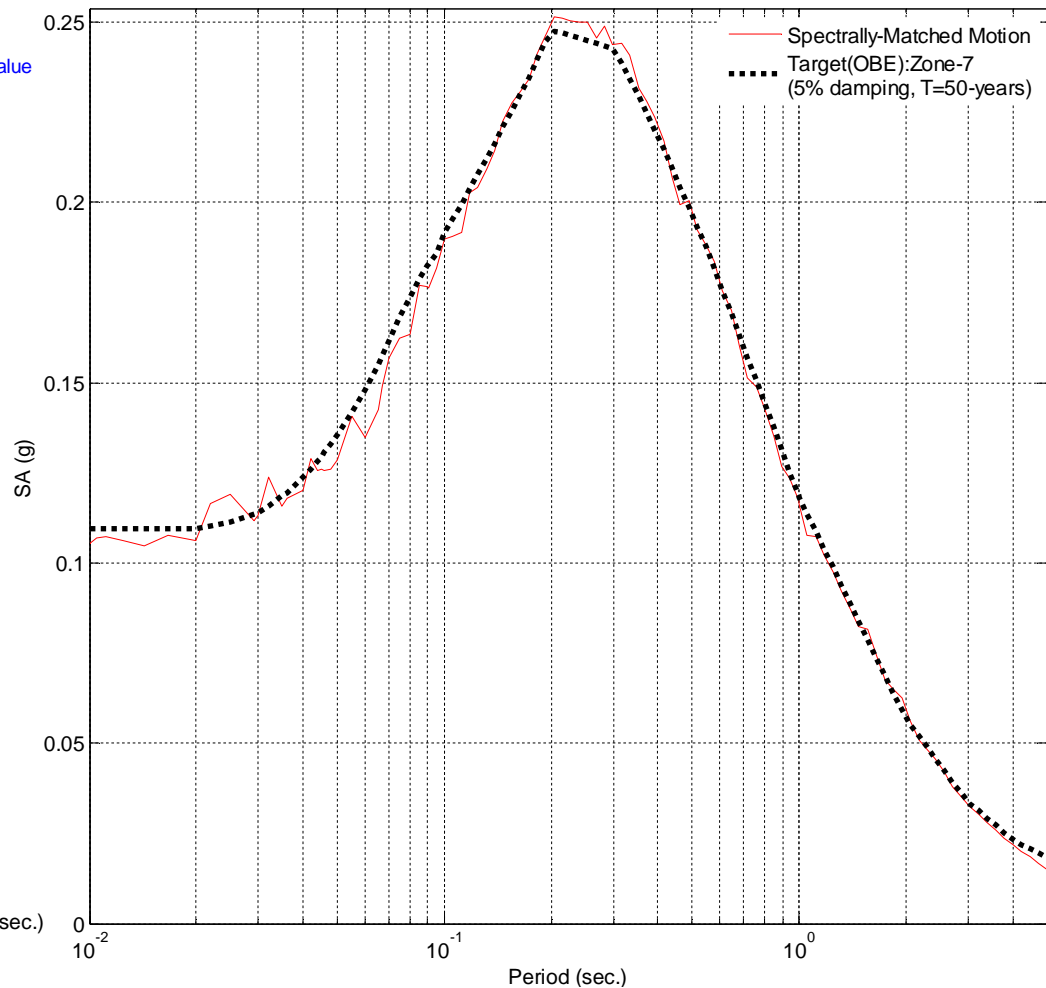| SC SOLUTIONS | PROJ. NO: | | SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 6 – HORIZONTAL 1 | PLATE |
	BY:	J. Zhong		**B7-16**
	QC CHECK:	M. Perez		
	QA CHECK:	V. Jacob		
	DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

**Time Histories for Spectrally-Matched Motion
(H2-Component)**

**Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#1776):Hector Mine(1999), Station Name: Desert Hot Springs]**

Signed Peak Value

A(g) — 0.104

V(cm/s) — 8.42

D(cm) — -4.42

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 6 – HORIZONTAL 2	PLATE
BY:	J. Zhong		**B7-17**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion (V-Component)

Signed Peak Value

A(g)   0.066

V(cm/s)   -4.27

D(cm)   2.24

0   10   20   30   40   50   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#1776): Hector Mine(1999), Station Name: Desert Hot Springs]

Spectrally-Matched Motion
Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 6 – VERTICAL	PLATE **B7-18**
BY:	J. Zhong		
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob		
DATE:	09/13/2012	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	

Time Histories for Spectrally-Matched Motion
(H1-Component)

Signed Peak Value

A (g)

-0.104

V (cm/s)

11.76

D (cm)

-5.02

0   20   40   60   80   100   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (H1-Component)
[Seed Motion (NGA#2938):Chi-Chi05, Taiwan(1999), Station Name:CHY016]

—— Spectrally-Matched Motion
•••• Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS

PROJ. NO:		SPECTRALLY-MATCHED MOTIONS – OBE ZONE 7 – SET NO. 7 – HORIZONTAL 1	PLATE
BY:	J. Zhong		**B7-19**
QC CHECK:	M. Perez		
QA CHECK:	V. Jacob	CALIFORNIA HIGH SPEED TRAIN PROJECT FRESNO TO BAKERSFIELD, CALIFORNIA	
DATE:	09/13/2012		

**Time Histories for Spectrally-Matched Motion
(H2-Component)**

Signed Peak Value

A(g)   0.104

V (cm/s)   -8.37

D (cm)   -3.8

0   20   40   60   80   100   (sec.)

**Spectra for Target (OBE) and Spectrally-Matched Motion (H2-Component)
[Seed Motion (NGA#2938):Chi-Chi05, Taiwan(1999), Station Name:CHY016]**

——— Spectrally-Matched Motion
• • • • Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

0.25
0.2
0.15
0.1
0.05

10^{-2} 10^{-1} 10^{0}

Period (sec.)

SC SOLUTIONS

PROJ. NO:	
BY:	J. Zhong
QC CHECK:	M. Perez
QA CHECK:	V. Jacob
DATE:	09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 7 – HORIZONTAL 2

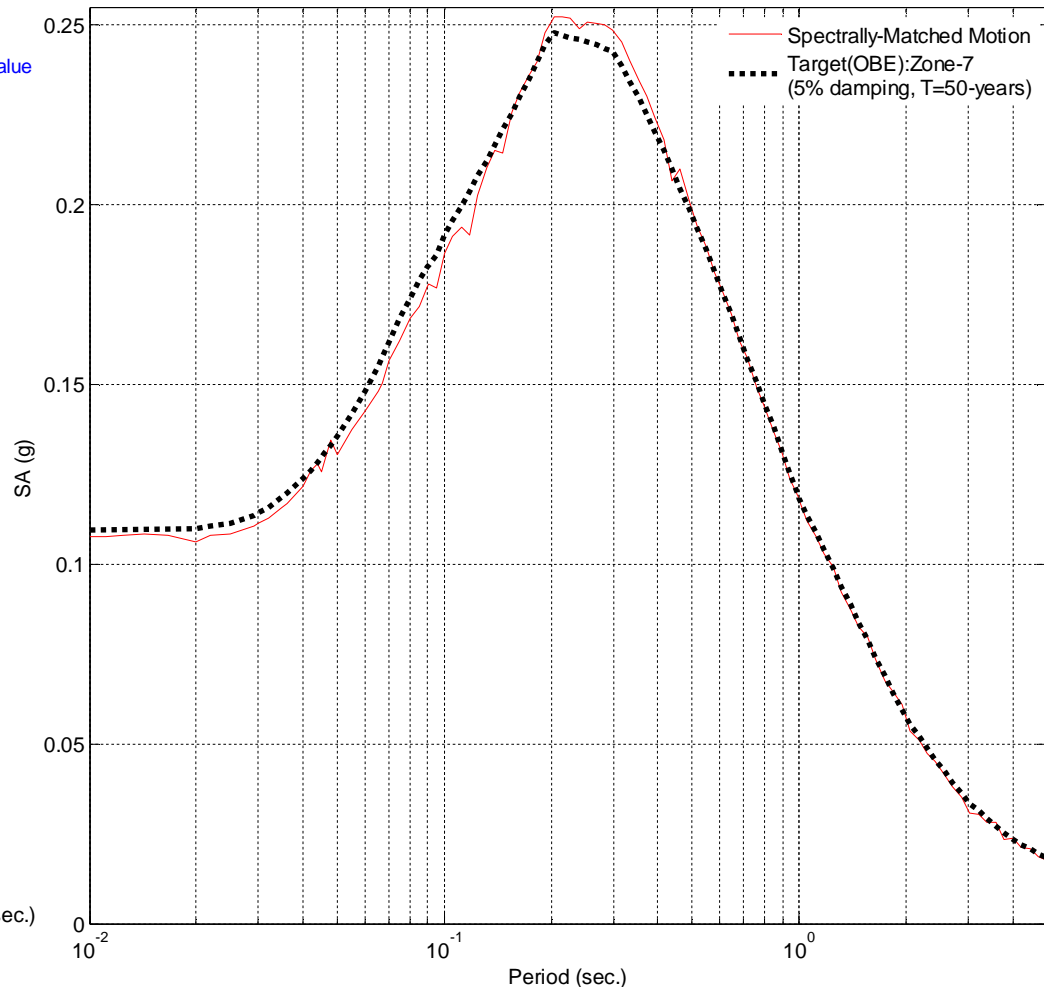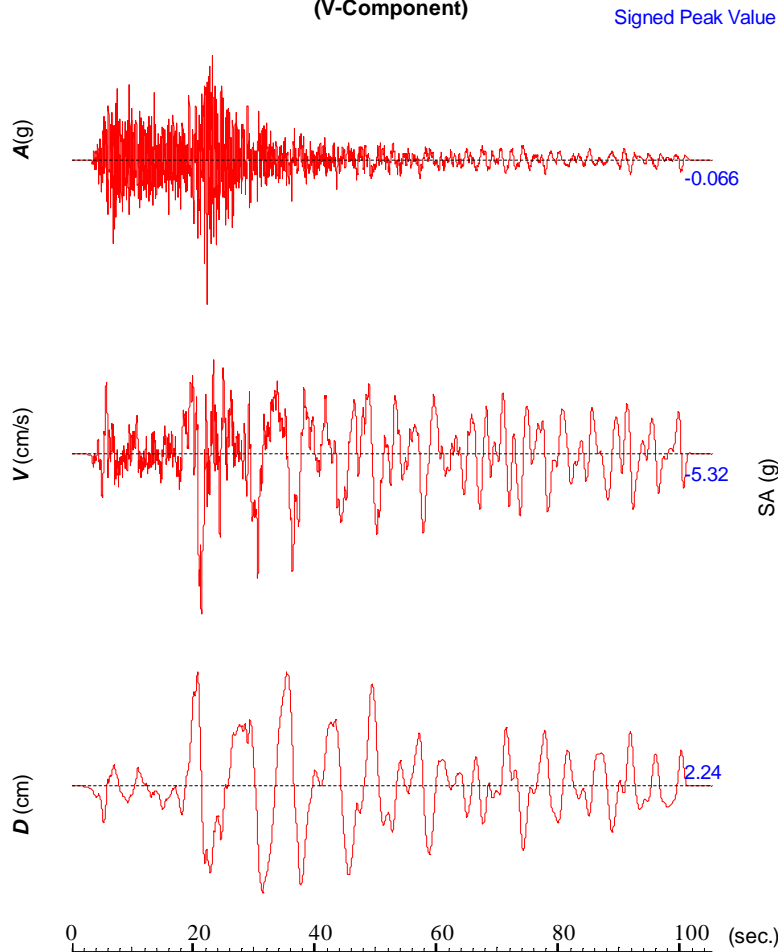CALIFORNIA HIGH SPEED TRAIN PROJECT
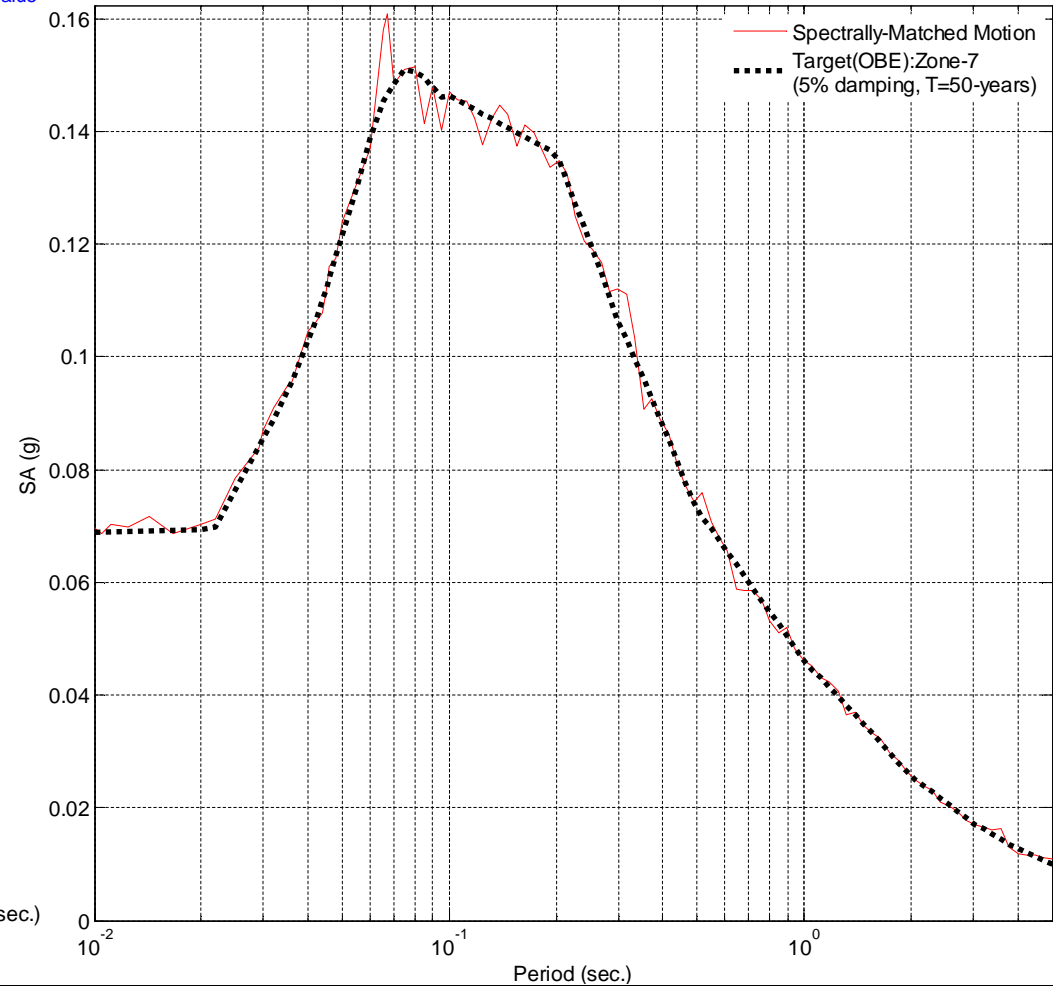FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-20

Time Histories for Spectrally-Matched Motion (V-Component)

A(g)

Signed Peak Value

-0.066

V (cm/s)

-5.32

D (cm)

2.24

0   20   40   60   80   100   (sec.)

Spectra for Target (OBE) and Spectrally-Matched Motion (V-Component)
[Seed Motion (NGA#2938):Chi-Chi05, Taiwan(1999), Station Name:CHY016]

— Spectrally-Matched Motion
···· Target(OBE):Zone-7
(5% damping, T=50-years)

SA (g)

Period (sec.)

SC SOLUTIONS	PROJ. NO:
	BY: J. Zhong
	QC CHECK: M. Perez
	QA CHECK: V. Jacob
	DATE: 09/13/2012

SPECTRALLY-MATCHED
MOTIONS – OBE
ZONE 7 – SET NO. 7 – VERTICAL

CALIFORNIA HIGH SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD, CALIFORNIA

PLATE

B7-21